THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVIII. No. 686.] LONDON, JULY 4, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal: 28-candle gas; coke 66·70 per cent.; volatile matters 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

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GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
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These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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JOHN RUSSELL AND CO.,
THE WEDNESBURY TUBE-WORKS, WEDNESBURY;
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THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
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16, SOHO SQUARE,
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35, 36, 37, & 39, GRANBY ROW, MANCHESTER.

J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanised Tubes and High-Pressure Tubes, &c.

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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.

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RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL OR ELSE NO MONEY TAKEN FOR THE CONTRACT.

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Retort-Setters sent to all parts of Europe and America
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FOR THE ENGLISH GOVERNMENT
AND FOR THE GOVERNMENT OF THE NETHERLANDS,
AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
AND MANUFACTURERS OF

IMPROVED DRY GAS-METERS

Warranted to Measure correctly & not to vary.

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SILVER MEDAL, PARIS EXHIBITION, 1867.

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AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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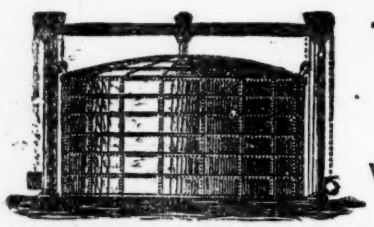
EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS



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RETORTS, ANNULAR AND PIPE CONDENSERS,
WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS
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Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,
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REFERENCES TO UPWARDS OF 300 GAS-WORKS.

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WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

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GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

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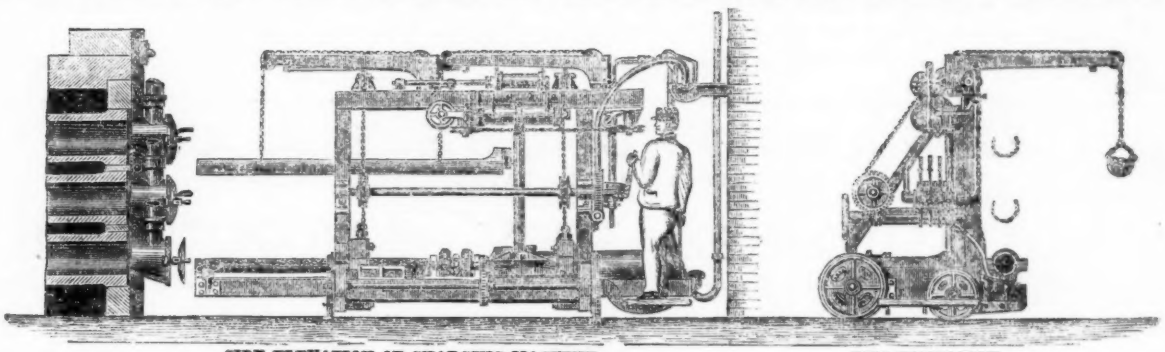
London Agent—ALFRED LAKEMAN, 9, FENCHURCH STREET, E.C.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

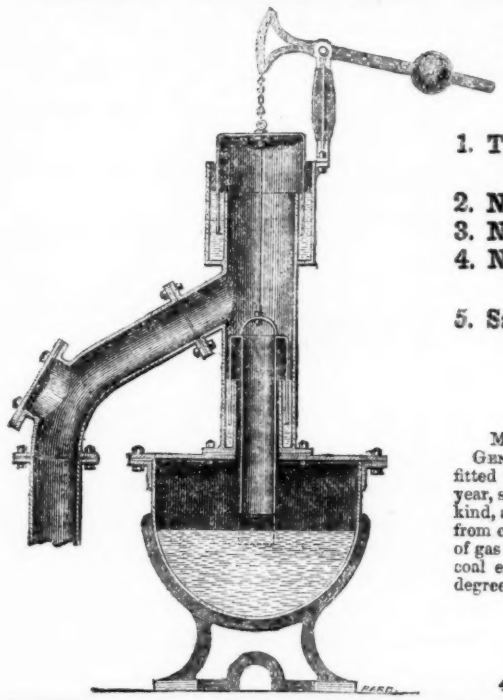
(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Tenby Gas-Works, March 29, 1876.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—In reply to your inquiry, I have to say that all the retorts at these works are fitted with your Self-Acting Patent Dip-Pipes. They have been in use now for more than a year, some for more than two years. They have never required repair or attention of any kind, and work admirably. By the use of these removable dips the retorts are kept quite free from carbon, the charges burn off more quickly than before they were adopted, and the yield of gas is increased. We get regularly a weekly and monthly average yield of gas per ton of coal exceeding 10,400 feet of 14-candle gas, and I attribute this excellent result in no small degree to the use of these Self-Acting Removable Dip-Pipes.

I am, gentlemen, yours faithfully,

(Signed) EDMUND H. STEVENSON.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

4, WESTMINSTER CHAMBERS, VICTORIA STREET, S.W.

MESSRS. CHANDLER & SONS,

Gas Engineers, Patentees, and Contractors, Triennial Contractors to Her Majesty's Government,

UNDERTAKE THE

ERECTION OF GAS OR WATER WORKS;

CONTRACTORS FOR PIPE-LAYING AND GAS-FITTING.

SOLE MANUFACTURERS OF THE CHANDLER AND STEVENSON PATENT SELF-ACTING DIP-PIPE.

ESTIMATES FURNISHED FOR EXTENSIONS OR ALTERATION TO EXISTING WORKS.

ADDRESS: 26, YORK STREET, SOUTHWARK, LONDON, S.E.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, VINCENT STREET,

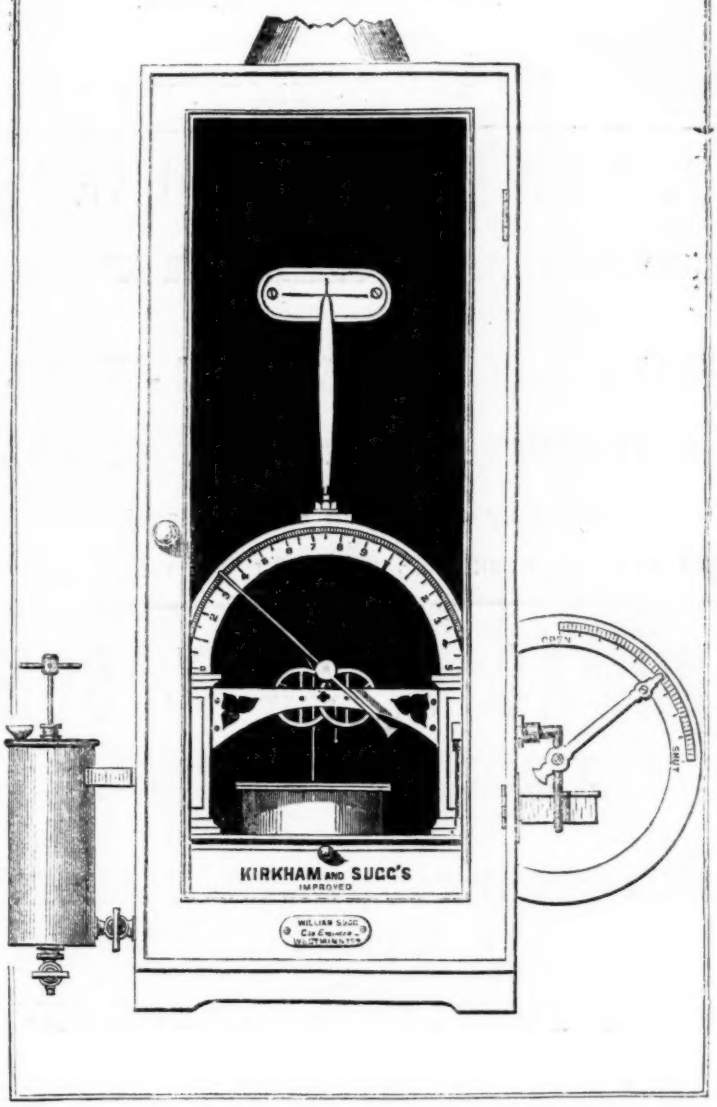
WESTMINSTER, S.W.

"EVANS"

Photometers,

which do not require a Dark Room, with every Fitting accurately made to Gauge, French Polished Bench and Drawers complete, as approved by the Gas Referees.

LOWE'S JET PHOTOMETER.



"LETHEBY"

Photometers,

with Fittings and Bench complete for Dark Room, as approved by the Gas Referees.

LOWE'S JET PHOTOMETER

(KIRKHAM AND SUGG'S IMPROVEMENTS),

With new external Water-Line Regulator; Improved Micrometer, with Quadrant divided into 45 degrees; Valve, with *pro ratâ* opening; Improved Ventilator, Purple Glass Height of Flame Measurer; King's Gauge, working on Friction Rollers. In French Polished Pine Case. Diagram for ditto for finding the Illuminating Power in Candles.

PRICE £12 10s. COMPLETE.

Can also be had with additional Scale on Pressure Gauge, to show by inspection the Illuminating Power in Sperm Candles, at a slight extra cost.

NOTE.—When an order is given for a Jet Photometer with this latter addition, it will be necessary to state about the quality of Gas for which it will be used. The range in candles will not be more than three or four.

PRICE LISTS WILL BE FORWARDED POST FREE ON APPLICATION.

HENRY GREENE & SON,

GAS AND HOT WATER ENGINEERS,

155, CANNON STREET, E.C.

Manufactory: 19 & 20, NICHOLAS LANE, E.C.

SUN-BURNERS,

With Regulating Valves to obviate down draught.

MEDIÆVAL & OTHER GAS-FITTINGS

For Churches and Domestic Use.

ARCHITECTS' OWN DESIGNS WORKED OUT.

ESTIMATES FREE OF CHARGE.

THE TRADE SUPPLIED.

SOLE CONSIGNEES FOR BRÖNNER'S IMPROVEMENTS IN GAS LIGHTING.

IN THE MATTER OF

BRÖNNER'S GAS-BURNERS.

HENRY GREENE AND SON, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.

Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.

Also that on the 20th of April, 1875, in a suit in Chancery, before Vice-Chancellor Malins, number 1874, B 365, he obtained injunction against another defendant, in the same terms and on similar grounds.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 7 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

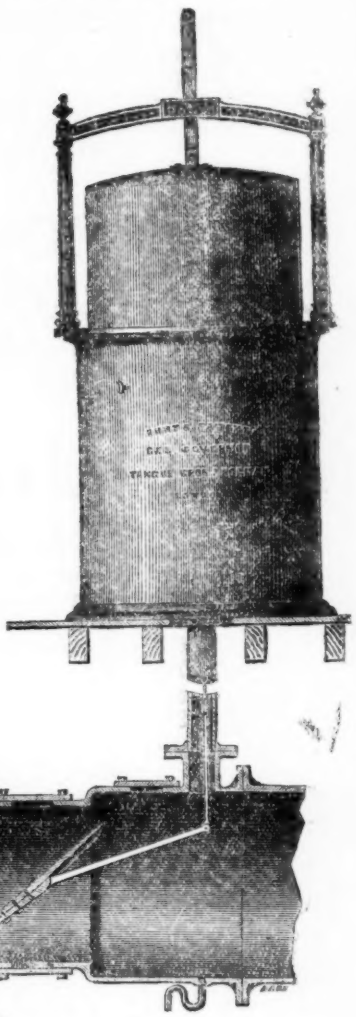
London Agent: Mr. A. C. FRASER, ST. STEPHEN'S CHAMBERS, TELEGRAPH STREET.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Co.—two 36 in. at Blackfriars.
" " a 36 in. at Goswell Road.
" " a 24 in. at "
" " a 24 in. at Whitechapel.
" " an 18 in. at Bow Common.
" " a 24 in. at Beckton.
" " a 6 in. at "
The London Gas Co.—a 24 in. at Nine Elms.
" " an 18 in. at "
" " an 8 in. at "

The Exeter Gas-Works—a 24 in.
" Abergavenny Gas-Works—a 10 in.
" Birmingham Gaslight Co.—an 8 in.
" Monmouth Gas-Works—an 8 in.
" Devonport Gas-Works—an 8 in.
" Cannes Gas-Works—an 8 in.
" Mentone Gas-Works—an 8 in.
" Rochdale Gas-Works—a 4 in.
" Imperial Gas Co., a 12 in at Great Cambridge Street.

TESTIMONIAL.

The Gaslight and Coke Company, 9, Water Street, New Bridge Street, Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

VIENNA EXHIBITION, 1873.—The highest prize and only Medal "for Progress" for Direct-Acting Steam Pumps for general purposes was awarded to TANGYE BROTHERS AND HOLMAN, Engineers, London, for

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

Upwards of 12,000 have been sold in England and America.

In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

The following are a few of the leading Sizes in use in Gas-Works and Chemical Works:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4*	2	9	815	18
3	3	9	1,830	18
5*	3	12	1,830	22 10
4	4	12	3,250	25
6*	4	12	3,250	30
5	5	12	5,070	32 10
7*	5	12	5,070	40
6	6	12	7,330	40
8*	6	12	7,330	50
7	7	12	9,750	50
10*	7	12	9,750	65

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.

NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short-stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

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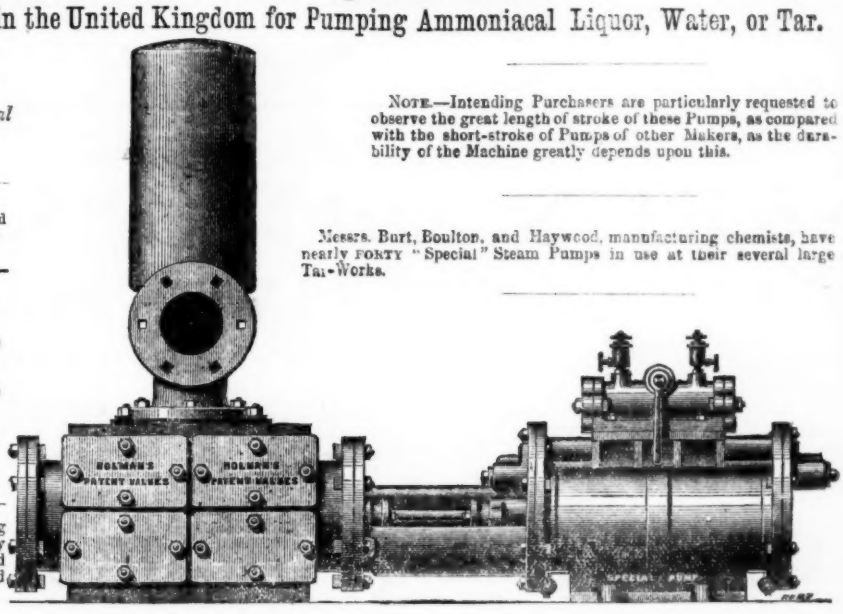

London 1851. New York, 1853 Paris, 1855. London, 1862.

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METERS FOR MEASURING WATER.

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THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 4, 1876.

Circular to Gas Companies.

THE Earl of Camperdown, having, as we said last week, much to learn with respect to metropolitan gas affairs, has asked for a variety of returns, for the cost of the printing of which we, as British taxpayers, distinctly object to be saddled with. He wishes for a statement of the capital accounts of the Chartered and South Metropolitan Companies, distinguishing between share and loan capital, and the amounts paid up on each; and he further requires to know the rates per thousand feet which the Metropolitan Gas Companies have charged in the years 1859, 1861, 1869, 1875, and 1876. The object which the Earl has in view, in moving for these returns, is not very apparent, unless he wishes to confute the observation of the Right Hon. Robert Lowe, who asserted that, during the twenty-five years he had lived in London, gas had become dearer and dearer. The returns asked for by the Earl of Camperdown would have effectually dispelled this illusion, and rendered nugatory the statement of one who may some day be the noble Earl's colleague in office. If we protest against the publication of the returns asked for, it must be remembered that we do so only in the capacity of taxpayers, who consider half a million a year too much to be spent on printed paper which scarcely anybody reads. If the Earl of Camperdown will only appeal to the very amiable and intelligent officials in the library of the House of Lords, he will be able to consult the returns moved for by Mr. Joseph Hume in 1850; those subsequently asked for by Mr. Brotherton, and published, after the lamented decease of that gentleman, in 1857; and, lastly, a sort of continuation of the same returns, obtained by Mr. Moor, the member for Brighton, and issued in 1865. These papers, which will be found in the House, and a small investment in a copy of Mr. Field's, or our own Analysis of the accounts of the Metropolitan Gas Companies, will furnish the noble lord with all the information he wants, without putting the British taxpayer to the cost of a paper which only two persons will peruse—the printer's reader and, perhaps—but this is by no means certain—the noble lord who moved for the return. We feel bound to protest against his intrusion on our pockets, and are grateful to the Duke of Richmond and Gordon for so far limiting the expense of the return, as that it will only include the price of gas in the Metropolis for the years 1859 and 1861, which can easily be obtained from the returns above specified.

When Lord Camperdown gets his returns, he will see that in 1859 the price of gas was, on the average, more than forty per cent. in excess of what it is to-day. His paper will follow the price down, until we arrive at that now charged, and Lord Camperdown may take our word that London, from now to the end of time—whether the supply of gas be in the hands of an united company or a municipality—will never be supplied with gas at a less price than it is at the present moment. The future is, however, somewhat uncertain. Coal may fall in price, and the price of gas will fall with it, but coincident will be a reduction of prices which will mark a decadence in the wealth of this kingdom. The Lord Chancellor of this day should sit on a sack of coals, and not of wool, for the former is now the staple of England's industry. When that is exhausted or superseded, the fate of this country is settled. This is an "aside," as a theatrical author would write. We have, for the moment, to do with Lord Camperdown, who has perhaps an hereditary tendency to meddle with metropolitan gas matters. In 1860, the Earl of that name—we confess, with shame, that we have not "Debrett" in our plebeian library, and hence are not certain of the relationship with the present lord, but we presume it was paternal—moved, on the 14th of May, 1860, for a return from each Metropolitan Gas Company of the acreage of the several stations, the cubical contents of the several gasholders, and, to sum up shortly, the manufacturing, storeage capacity, and quantity of gas delivered from each station during the months commencing December, 1859, and ending June, 1860. We have not yet been able to put our hands on this return; but the present Lord Camperdown will, no doubt, find it among the family archives, and it may prove of essential use to him in his present campaign against the Metropolitan Gas Companies. We should be glad to find the paper, for it will presently be of great use to us, when we come to describe the enormous advance of the gas industry of the Metropolis since 1860.

It is somewhat unusual for a permanent secretary of a Government to write letters to the newspapers in defence of a measure under the consideration of Parliament; but, as our readers saw last week, Mr. Farrer has seen fit to do so; and perhaps, after all, he is not to be blamed. The general public will accept the explanation of such an official with the utmost respect, and probably all who read the letter, or nearly all—for, as will presently be seen, one gentleman dissents—are satisfied that gas companies, under the new legislation, will find it to their interest to do the best they can for their customers. The auction clauses will bring to the companies capital, on which the shareholders will receive 10 per cent. and the public will only pay 5 per cent., and it is believed that this arrangement will deprive the companies of all inducement to raise unnecessary capital. This is evidently Mr. Farrer's view of the case; but Mr. G. C. Cleminshaw, whose communication to "*The Times*" we print in another column, seems inclined to think that the auction clauses may have precisely the opposite effect. We do not see the force of all Mr. Cleminshaw's reasoning, but we may admit that, if the auction clauses stood alone, there might be temptations to raise new capital, in order to make the dividend on the old higher, and more and more secure. Both the correspondents of "*The Times*," how-

ever, fail to refer to the fact that, under the proposed legislation, the companies will have to prove that they need new capital before they can raise it. As to any jugglery with revenue and capital accounts, a public auditor renders that impossible, and the notion that new works will be started simply to absorb capital is absurd. That the construction of new works has led to a large increase of the capitals of the Chartered and Imperial Companies is beyond dispute; but then everybody recognizes the thoughtful foresight which dictated the expenditure. The Bill of the Chartered Company, now before Parliament, provides for all the extensions which will be required for several years to come.

We must again refer to a matter which we do not think has received all the consideration it deserves. The auction clauses have never been tried in conjunction with the sliding scale of dividend. Mr. Farrer assumes that the issue of £500,000 of new capital will produce a million. Will it? That remains to be seen. We shall not to-day speculate on the consequences of another coal famine when the new legislation is adopted. It must, however, be borne in mind that there will then be no guarantee for a dividend, and investors, we rather think, will be cautious.

The correspondence printed by the Board of Trade, in compliance with the order of the House of Commons, moved for by Colonel Makins, is of a somewhat remarkable character. In order that it may be understood, a brief recapitulation of facts is necessary. The City of London Gas Act, 1868, directed the appointment of three competent and impartial persons, one of whom was to be practically acquainted with the manufacture of gas, as Referees, to determine certain questions and prescribe certain regulations. In compliance with the Act, the Duke of Richmond, then President of the Board of Trade, appointed, as Referees, Mr. F. J. Evans, the well-known engineer of the Chartered Company; Mr. R. H. Patterson, who had achieved a reputation as a financier and political economist, and who was connected with the Conservative press, but who has since told us that until he was appointed he had no practical knowledge of gas matters; and Mr. J. S. Pierce, a railway engineer, whose political proclivities are, we think, understood at Dover. The establishment subsequently included Mr. T. Foster, as secretary, of whose antecedents we know nothing, and Mr. Thompson, a promising young chemist, now deceased. Mr. Evans retired very early, and need not be alluded to here. He was succeeded by Dr. W. Pole, whose name is well known to the readers of this JOURNAL. The salary of each Referee was originally £400 per annum, and the whole establishment cost the gas companies an average of £3000 a year. It must be stated here, however, that much of this money was invested in fixed plant at the testing-stations, and, probably, only about £1600 a year was spent on salaries.

The correspondence published, opens rather abruptly with a letter from the Secretary of the Chartered Company to the Board of Trade, stating that the Company had purchased patent coal from a company of which Mr. J. S. Pierce, a Referee, was the London agent, and cannel coal from Mr. Foster (the secretary), as a principal. Now, it is not at all to be wondered at that the gentlemen brought into intimate connexion with the managers of gas companies should seek to make the best of their position. Four hundred a year is little enough to exist upon, and we are not at all surprised that Mr. Pierce undertook the sale of MacKenzie's patent coal on commission, and that Mr. Foster's fraternal instinct should, under the circumstances in which he found himself, incline him to assist his brother in disposing of cannel coal. Mr. Patterson did not deal in coal, but, as our readers know, devoted himself to a study of the processes of purification, which, in the end, led him to take out the patent recently the subject of litigation. It would seem that the Board of Trade did not approve of the patent and the dealing in coal, and, considering that the work the Referees had originally been appointed to do had been accomplished, it was announced to them that their appointments would not be renewed. As the Acts of 1868–1869 could not be worked without Referees, the office was reconstituted with due regard to economy. That is the short and long of the story told in this correspondence, the publication of which we have no hesitation in saying is a waste of public money. That our columns will presently be occupied with explanations and recriminations we already have evidence, but no space can be found for any to-day.

We have nothing to report this week as to the progress made in the negotiations for further amalgamations in the Metropolis; but we have reason to believe that they are proceeding favourably, and we hope the end we have steadily kept in view will soon be arrived at.

The North British Association of Gas Managers will hold their annual meeting in Edinburgh on Friday week. The papers to be read are of general and varied interest; but very little time is allowed for their discussion. It will be a hard day's work for the members; but we hope they will enjoy themselves.

Water and Sanitary Notes.

ONE more effort is being made to bring about some combination of the sanitary authorities along the Thames Valley for the purification of sewage, which must presently be excluded from the river, unless purified to the satisfaction of the Thames Conservancy Board. This time the Vestry of Richmond take the initiative, and decide on making an application to the Local Government Board to form the urban and rural sanitary districts between Hampton and the western boundary of the Metropolis into united districts for carrying into effect a system of sewerage. The object of the Richmond Vestry is simply delay. They will never do anything but talk, if they can possibly avoid it. They have been talking for years, and they will talk for ever if they are allowed, and can find an excuse. Kingston and Surbiton, we are given to understand, have decided on treating their sewage by Hille's process, which is in use at Wimbledon, Tottenham, Edmonton, Taunton, and other places. The two Surrey districts named are thus not likely to fall in with the views of the Richmond vestrymen.

We give, for the first time, a full report of the proceedings at a general meeting of a Metropolitan Water Company. The directors of the Chelsea Water Company have very wisely resolved that, for the future, their meetings shall be open to the press—that is, to the public—and we hope all the other water companies will follow their example. No one of these has anything to conceal. The meeting of the Southwark and Vauxhall Company the other day was somewhat stormy, and concluded with the announcement of the resignation of the engineers; but, even in such cases, it is the wiser course to give the utmost publicity to the facts. It need hardly be said, that the Chelsea Company are in a very prosperous state, and pay their usual six per cent. dividend. It is gratifying to see that, by efficient inspection, the company have very considerably reduced the waste of water. From our own observation, we feel convinced that, if the several water companies would only gently exercise the powers they possess, they might, with advantage, reduce the consumption, or rather, the waste, of water, twenty per cent.

The Town Council of Liverpool have not yet settled the water question, but it seems now to be clearly indicated that the ultimate decision will be in favour of the Windermere scheme. The Water Committee have been instructed to base their calculations as to the water necessary, on a supply of 30 gallons per head of population per day, and not 25 gallons, which they have reported was considered sufficient. This is taking a large view of the future requirements of Liverpool, but in the end it is certain to prove more economical to make at once the most ample provision. We are only afraid that a ratepayers meeting, a few months hence, will not see things in the same light as the majority of the Town Council.

We are very happy to see that arrangements have been come to between the Corporation of Wakefield and the Water Company. The latter have accepted the price offered by the Corporation for the original capital, and now the Corporation have decided to give £11 for each £10 share issued, to meet the Company's parliamentary expenses. Three thousand of these latter shares have been issued, representing £30,000, which the Company have been compelled to spend in defence of their own interests, and which the Corporation now pay, in addition to what they themselves have spent—probably not much less—in parliamentary proceedings, which are thus practically admitted to have been wasted.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XCVIII.

COMPOSITION AND ANALYSIS OF PURIFIED GAS.

In accordance with the plan laid down for this work, we have brought the gas from the retort to the gasholder. The dense, brown vapours of the complex composition, mentioned in the early part of this work, which issued from the retort, have, by the successive operations of condensing, washing or scrubbing, and purifying, been reduced to a light, invisible, aëriform fluid, the chemical composition and physical properties of which we have now to study. Crude gas—that is, gas as it leaves the retorts—we have shown to be composed of at least fifty distinct elementary gases and chemical compounds. The majority of these are left behind in the process of condensation.

The comparatively few that pass on are further reduced in quantity, or wholly removed in the subsequent operations. Thus, when the gas has arrived at the holder, it may be said to be a mixture of the following ingredients, varying in proportion according to circumstances:—

Hydrogen	H
Marsh gas	CH_4
Olefiant gas	CH_2

Other hydrocarbon gases	(?)*
Acetylene	C_2H_2
Naphthaline	$C_{20}H_8$
Carbonic oxide	CO
„ acid	CO_2
Sulphuretted hydrogen	H_2S
Bisulphide of carbon	CS_2
Cyanogen	CN
Sulphocyanogen	CNS
Ammonia	NH_3
Oxygen	O
Sulphuretted hydrocarbons	(?)†
Nitrogen	N
Aqueous vapour	H_2O

The amount of several of the above-named constituents depends entirely on the care and trouble taken in the purification of gas. Thus, sulphuretted hydrogen is rarely found in the gas from works of any magnitude. Ammonia is now almost entirely eliminated, on account of its commercial value; and only a very small amount of carbonic acid is found, except where oxide alone is used as the purifying material, and the low price of cannel makes the reduction of illuminating power, which results from its presence, of no consequence.

We have assumed all along that the readers of this work possess some knowledge of chemistry; but it may be well here to give a brief description of the elements and compounds enumerated above:—

Hydrogen is a colourless, invisible, incondensable gas, and the lightest of all known bodies. Its specific gravity (T. 60° Fahr., B. 30 inches) is only 0·0692, and 100 cubic inches weigh 2·15 grains. The amount of this body in coal gas is subject to much variation, depending probably on the quantity of moisture in the coal distilled, and on the temperature of the distillation. In the first case, the aqueous vapour (H_2O) generated is decomposed in its passage over and through the red-hot coal, the hydrogen being set free, and the oxygen combining with carbon to form carbonic oxide and carbonic acid.

The proportion of hydrogen in gas of high illuminating power does not exceed 10 or 15 per cent., and in such cases it, no doubt, all results from the decomposition of water. But when coal is distilled at a very high temperature, the hydrogen in the gas sometimes amounts to 50 per cent. and more of the total volume, and in such cases, having regard to the low illuminating power of the gas, it must be inferred that some of the hydrocarbon gases and vapours have been decomposed with the separation of hydrogen. The gas is of course inflammable, and when burned under ordinary conditions the flame exhibits very little luminosity; but Dr. Frankland has shown that, when consumed under considerable atmospheric pressure, the flame is much more luminous, and on this fact, and others, he has founded a theory which will be noticed hereafter. The modes of preparing pure hydrogen for experiment will be found described in all elementary books on chemistry, and we need not mention them here.

Marsh Gas, *Light Carburetted Hydrogen, Hydride of Methyl*, which, in most cases, constitutes the bulk of coal gas, is always found occluded in coal. It is formed by what may be called a natural process of decomposition from any vegetable matter into the composition of which carbon and hydrogen enter. It is the *fire-damp* which is evolved in enormous quantities from some coal seams, and occasions terrible disasters when miners are careless. Marsh gas is colourless and tasteless, and, when pure, burns with a flame exhibiting but feeble luminosity. The specific gravity is 0·553, and 100 cubic inches weigh 17·15 grains. The proportion of this body in coal gas varies from 30 to 60 per cent.

Olefiant Gas, *Ethylen, Elayl*, is one of the most important constituents of coal gas, ordinary gas of fair quality containing from three to five per cent., and rich cannel gas from about 20 to 30 per cent. It is a colourless gas, having when pure an ethereal odour and taste. It can hardly be said to be poisonous; but it possesses powerful anæsthetic properties, which have too often been illustrated by accidents—death, when these have proved fatal, having probably been occasioned by carbonic oxide. The specific gravity of olefiant gas is 0·967, and 100 cubic inches weigh 30·341 grains. This is the most important of the illuminating constituents of coal gas. When burned with free access of air, it gives a yellowish-white flame of great power. Olefiant gas is slightly soluble in water, 100 volumes of the latter dissolving 8 volumes of the former. It is due to this fact that excessive scrubbing with water has been found to greatly diminish the illuminating power of coal gas. Beyond this, it need only be mentioned, that olefiant gas, like others which will be noticed, is absorbed by bromine and fuming sulphuric acid. It can also be removed by passing coal gas through alcohol, turpentine, and olive oil. By an intense white heat, it is said to be resolved into its constituents, carbon and hydrogen, and in a retort at bright redness it is probably decomposed into carbon and marsh gas. Hence the reduction of illuminating power which ensues when high heats are employed, and a sufficient exhaust is not maintained.

We have now to mention some other gaseous hydrocarbons, whose existence in coal gas is well established, but the proportions of which have not been accurately ascertained. These are Propylen or Tritylen (C_3H_6), Butylen or Ditrylen (C_4H_8), and Acetylen (C_2H_2).

(To be continued.)

* We group these bodies here; but an enumeration and description of them, so far as they are yet known, will be given further on. Some French chemists have recently made additions to our knowledge of these constituents of coal gas.

† The existence of these bodies is conjectural; but there are good reasons for believing that the vapours of one or more bodies, in which sulphur is an essential element, are present in ordinary coal gas.

Correspondence.

CALCULATION OF COST PRICE OF GAS TO PUBLIC LAMPS.

Sir,—I have the fortune or misfortune (I cannot say which) of being manager of a small works, where there is endless trouble about the quantity of gas supplied to the public lamps, the gas company being under contract to supply the Municipal Commissioners lamps for a number of years at cost price. I have been frequently called upon to furnish a statement of the cost price of the gas, but my statement has been discredited, my adversaries asserting that I have no right to include certain costs in my estimate.

Annexed is a full statement of my calculation, and I am anxious to know if, in your opinion, there is any item which (in fairness) should not be brought into the account.

Dr. Cost Price of Gas per 1000 Cubic Feet.				*Cr.*			
Coals	£346	7	10	Coke	£62	9	10
General expenses	25	9	1	Tar	20	11	3
Rent, taxes, &c	31	11	2	Refuse lime	2	10	0
Repairs	96	19	2				
Wages	72	12	6				
Manager & secretary's salaries	125	0	0				
Interest on capital, £3000, at 5 per cent.	150	0	0				
	£847	19	9		£85	11	1
Credit residual products	85	11	1				
	£762	8	8	cost of making 2,491,800 cubic feet.			

Cub. Ft. Cub. Ft.
As 2,491,800 : 1000 : : £762 8s. 8d. to the answer.
20

15248
12

182984
1000

2491800) 182984000 (73½d.
17442600

6s. 1½d. cost price per 1000 cubic feet.
8558000
7475400

1082600

You will oblige me much by inserting the foregoing in the Journal at your earliest convenience. R. A. G.

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, June 26.

The Chairman of Committees informed the House that the oppositions to the Tipton Local Board and the Tunbridge Wells Gas Bills were withdrawn.

A report was read from the select committee on the West Bromwich Improvement Bill, that they had not proceeded with its consideration, the opposition thereto having been withdrawn.

The Norwich (City) Water Bill was read the third time, and passed.

The Kildwick Parish Gas Bill was read the third time, with the amendments; further amendments made, and bill passed.

The following bills were read the third time, with the amendments, and passed:—Paisley Water, Whitehaven Town and Harbour Improvement, Huddersfield Water and Improvement, Southampton Gaslight and Coke.

Tuesday, June 27.

The following bills received the Royal Assent:—Gas and Water Orders Confirmation, Chesterfield Water and Gas, York New Water, Galashiels Municipal Extension Police and Water, Gorleston and Southtown Gas, Plymouth Dock (Devonport) Water, Norwich (City) Water.

The Chairman of Committees informed the House that the opposition to the Smethwick Local Board Bill was withdrawn.

The Leigh and Hindley Local Boards Bill was returned from the Commons agreed to, with amendments, which were considered and agreed to.

The Horncastle Gas and the Southport Improvement Bills were reported, with amendments.

The Spennymoor and Tudhoe Gas Bill was reported, with an amendment.

The Slaithwaite Gas Bill was read the third time, and passed.

The Walsall Gas Purchase and Borough Extension Bill was read the third time, with the amendments; further amendment made, and bill passed.

BURGHS (SCOTLAND) GAS SUPPLY BILL.

The Earl of Galloway, in moving the second reading of this bill, stated that it was a measure to enable the corporation or the local authority of any town which desired to adopt the Act, to erect works to supply it with gas without coming to Parliament. The bill did not include those places where gas was supplied by any company which had been incorporated, and obtained statutory powers for that purpose. He might mention that the measure had been very carefully considered, having been twice before a select committee of the House of Commons, and that it had passed through all the stages in that House without opposition, and, he believed, with the concurrence of the Government. The bill was very popular in Scotland, and there was no objection upon the part of private companies to its passing. The Chairman of Committees (Lord Redesdale) had pointed out that there might be improvements made in the bill, and, therefore, he proposed to ask their lordship to read the bill a second time, with the intention that it should not be brought forward in committee for another fortnight.

Lord Redesdale said he quite agreed with the noble earl that the bill was very imperfectly drawn, but still he thought it was a good one; and he considered that, under the circumstances, their lordships might accede to the proposition and read the bill a second time.

The bill was then read a second time.

Thursday, June 29.

The Dewsbury and Heckmondwike Water and the Dunfermline Water Bills were reported, with amendments.

The Uppingham Water Bill was reported, without amendment.

ACCOUNTS OF THE METROPOLITAN GAS COMPANIES.

The Earl of Camperdown had placed the following notice on the paper for this evening:—"To ask for a statement of the capital of The Gaslight and Coke Company, distinguishing the moneys authorized to be raised in the form of shares from the moneys authorized to be raised by loan; and showing also the amount which has been, up to the present time, raised in the form of shares and of loan respectively. Also to ask whether it is not the case that the company are now

charging for gas 4s. 8d. per 1000 cubic feet; and whether, in view of the fact that the charge proposed in The Gaslight and Coke Company's Bill is 3s. 9d., it is the intention of the Metropolitan Board of Works to take any steps under the revision clauses of the Act of 1868 in the interest of the consumers."

This notice was subsequently withdrawn, and the following notice substituted:—"To ask for a statement of the capital of The Gaslight and Coke Company and of the South Metropolitan Gas Company, distinguishing the moneys authorized to be raised in the form of shares from the moneys authorized to be raised by loan, and showing also the amount which has been, up to the present time, raised in the form of shares and of loan respectively. Also to ask for a statement of the rate per 1000 cubic feet charged by each company in the years 1859, 1861, 1869, 1875, and 1876."

The noble earl having made his motion,

The Duke of RICHMOND and GORDON said: The whole of the information which the noble earl asks for is contained in the accounts of each metropolitan gas company. The accounts are regularly certified by an auditor, and, in accordance with the provisions of the 31st and 32nd Vict., c. 125, are annually laid before Parliament. The accounts for this year are in the printers hands, and will be, as usual, laid before the House; therefore, that part of the noble lord's motion is unnecessary. This remark does not apply to the accounts of 1859 and 1861, inasmuch as the Act which directs that these accounts shall be annually certified and laid before Parliament was not passed till 1868. Therefore, as regards those two years, the order cannot be made, and as regards the others, the information is already given in the way I have mentioned. I am rather surprised that the noble lord was not aware of this, as he takes such interest in gas legislation; but I think he must have been rather misled in the questions he proposed to put, and which are on the notice paper, with regard to the precise charge for gas and the illuminating power.

The Earl of CAMPERDOWN made an observation which did not reach the gallery.

The Duke of RICHMOND and GORDON: My noble friend altered the terms of the motion which was on the paper for Tuesday. He left out some portion of it, and I find that the portion which he left out referred to the price paid for gas—viz., so much per 1000 cubic feet. The noble earl must have been ignorant of the fact that there are two sorts of gas which are supplied by The Gaslight and Coke Company, and dealt with under the Act of Parliament—namely, cannel gas, which has an illuminating power of 20 candles, and which is supplied to this House and other places; and common gas, which is of 16 candles illuminating power, and which is supplied to three-fourths of the Metropolis; and therefore I am not surprised that the noble earl, having made inquiry, should find that that part of his motion was unnecessary.

The Earl of CAMPERDOWN said he should be quite satisfied if the noble duke would promise that the accounts for 1875 should be laid on the table of the House in due time, that their lordships might see them before the bills of the two companies he had named came on for the third reading.

The Duke of RICHMOND and GORDON said, as he had already stated, the returns, in accordance with the provisions of the Act of Parliament, were now in the printers hands, and they would be laid on the table as soon as they could be obtained from the printers. That was all he could say.

The Earl of CAMPERDOWN: That will be, I trust, before the third reading.

FRIDAY, JUNE 30.

The Leigh and Hindley Local Boards, and the Slaithwaite Gas Bills received the Royal Assent.

The following bills were reported, with amendments:—West Bromwich Improvement, Tipton Local Board, Colney Hatch Gas, Kirkcaldy Burgh and Harbour, Tunbridge Wells Gas.

The Spennymoor and Tudhoe Gas Bill was read the third time, with an amendment, and passed.

The Southport Improvement Bill was read the third time, with the amendments, and passed.

HOUSE OF COMMONS.

MONDAY, JUNE 26.

The Blackrod Gas Bill (Lords) was read a second time, and committed.

TUESDAY, JUNE 27.

The Sutton Gas Bill (Lords) was reported, with amendments.

The Leigh and Hindley Local Boards Bill (Lords) was read the third time, and passed, with amendments.

THURSDAY, JUNE 29.

The Gas and Water Orders Confirmation (Chapel-en-le-Frith, &c.) Bill (Lords) was considered in committee and reported, without amendment.

PARLIAMENTARY EXPENSES OF THE METROPOLITAN BOARD.

Mr. KAY-SHUTTLEWORTH gave notice that on the 3rd of July he would ask the Chairman of the Metropolitan Board of Works when the returns, ordered on the 22nd of March, 1875, of expenditure for five years, and of the parliamentary expenses of the Board, will be presented.

FRIDAY, JUNE 30.

The Lords amendments to the following bills were agreed to:—Huddersfield Water and Improvement, Kildwick Parish Gas, Paisley Water, Whitehaven Town and Harbour Improvement.

Examiners report presented—"That the Standing Orders not previously inquired into have been complied with in the case of the Llandudno Improvement Bill (Lords)."

The Gas and Water Orders Confirmation (Chapel-en-le-Frith, &c.) Bill (Lords) was read the third time, and passed.

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

WEDNESDAY, JUNE 28.

(*Before the* LORD CHIEF JUSTICE *and Justices* BLACKBURN *and* FIELD.)

THE EUPION GAS FRAUDS.

The point of law raised by the defendants Aspinall, Muir, Whyte, and C. Knocker, who in February last were found guilty of conspiring to defraud the Stock Exchange in reference to the shares of the Eupion Gas Company, came on for argument this day, and the unanimous opinion of the court was that the second count in the indictment stated a criminal offence—viz., a conspiracy to defraud the Stock Exchange, and to procure a false quotation of the shares in the scheme—it cannot be called the company, for, as the Lord Chief Justice emphatically remarked, "There was no company at all; it was all a fiction and a sham, from the beginning to the end." The court also found that the finding of the jury was correct, and ought to be sustained.

On being called up for judgment, some of the defendants asked for time to file affidavits in mitigation of sentence, and the court deferred sentence until Saturday.

SATURDAY, JULY 1.

At the sitting of the court this day, Aspinall and Knocker were each sentenced to twelve months imprisonment in Holloway Jail, and Muir and Whyte to two months.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

LONDON GAS.—Mr. C. G. Cleminshaw writes to *The Times*:—"I am glad to find the Board of Trade so far amenable to public opinion, that its secretary has thought it right to avail himself of *The Times* to explain the present state of the question. I also heartily recognize the value of its efforts to protect the interests of the consumer and public, by endeavouring to introduce better legislation. But, having devoted many years to the question, and being acquainted with its workings, I cannot allow Mr. Farrer's statement, that the 'auction clauses' will take away all motive from the directors of companies for increasing their capital beyond what is actually needed. Although the raising of capital under the 'auction clauses' is a great improvement on the old plan, yet the principle will still hold out strong temptations for unduly increasing capital, which are not likely to escape the notice of astute directors. Let us suppose that a gas company are dividing 10 per cent. on their original capital, and that they desire to increase it. They can do so by refraining from reconstructing the plant out of the revenue, and by using the sum which should be applied for that purpose to increase the dividend. When reconstruction becomes actually necessary, they can construct new works with new capital raised by auction, and paying, practically, only 5 per cent. They can thus reduce the charge on revenue, and can apply the surplus so obtained to add to the dividend on the original capital. In other words, suppose the reconstruction of plant requires an expenditure of £500,000 in one year, which ought to come out of revenue, the company will be able to raise new capital for the purpose, avoid making the charge on revenue, and, debiting the interest only as £500,000, at 5 per cent., or £25,000 instead of £500,000, save £475,000, which they can use to increase the dividend on the original capital. But it may be said that a public auditor has been appointed in order to see that the reconstruction of plant is charged to revenue. This is true, but so long as new works must be constructed to supply the constantly increasing demand for gas, there is nothing to prevent the gas manufactured at the old works being transferred to the new, and thus make the new plant take the place of the old without the reconstruction of the latter. There can be no doubt that this has been, in a great measure, the way in which the capital of gas companies has been so largely increased. Under the present system, the gas companies have a direct inducement to increase their capital by the profit obtained on each new investment; under the proposed system they will have an indirect inducement in order thereby to increase the dividend on their old capital."

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health, on the composition and quality of the metropolitan waters in June, 1876:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen. As Nitrates, &c.	Nitrogen. As Ammonia.	Hardness. Before Boiling.	Hardness. After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·00	0·060	0·105	0·000	12·1	2·4
West Middlesex	18·70	0·036	0·150	0·000	12·1	2·4
Southwark and Vauxhall	18·30	0·048	0·135	0·001	12·1	2·4
Chelsea	18·70	0·072	0·129	0·001	12·1	2·4
Lambeth	19·70	0·064	0·120	0·002	12·8	3·0
Other Companies.						
Kent	28·3	0·008	0·210	0·000	18·8	4·2
New River	19·2	0·04	0·135	0·000	13·2	3·0
East London	19·8	0·024	0·120	0·000	13·2	3·0

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was very slightly turbid—namely, Grand Junction, West Middlesex, Southwark and Vauxhall, Chelsea, and Lambeth.

C. MEYMOTT TIDY, M.B.

HYDRANTS IN THE CITY.—A letter has appeared in a daily contemporary from Mr. Edmeston, chairman of the Gas and Water Committee of the Corporation, in which, referring to the recent great fire at Queenhithe, he says: "I desire at this moment to direct particular attention to the fact that, except in one very small portion, we shall ere long have in the City—over all that area supplied by the New River Company—hydrants attached to the high-pressure mains now partly laid. A supply at any moment will be available, by the attachment of a hose and the turning of a tap by the nearest policeman, to throw a jet of water the height of 60 feet, so as to extinguish a fire in its earliest stage. This good work is commenced by the Corporation of the City of London, who, as streets are taken up to be repaired, have the pipes laid, and on Wednesday next the Gas and Water Committee will receive designs and estimates for hydrants, many of which, it may be hoped, will be ready for use in a few months. The cost for the entire City for this work, done from time to time, will probably be some £20,000, and the Corporation deserve credit for being the pioneers in this important movement. But, in the presence of a great catastrophe like the present one, inflicting heavy loss on individuals and on the fire offices, I want to ask whether the latter will not come forward and join in this work, so that the provision of hydrants may not be effected from time to time, taking some years to complete—as the relaying of pavements occur—but may be done at once, for the whole City, and without any delay. What is the contribution of £10,000 or even £20,000 compared with a great loss of £230,000, much of which might have been saved? Is it worth a moment's consideration? I cannot but feel that the circumstances only require to be known to be taken advantage of. According to the evidence given before the Society of Arts Committee for protecting the Metropolis from conflagration, it appears that in Manchester, Liverpool, and Glasgow, the provision of hydrants has reduced the calls for engine power to a very small per centage of fires, and that the loss of life and property is not more than one-third of what it is in London."

CLOSING OF A CITY WELL.—At the last meeting of the City Court of Sewers, Dr. Saunders, the medical officer of health, reported that in the course of a series of investigations into the condition of the water drawn from wells within the City, he had come across a sample so impure as to require immediate interference. The well was an old one situated upon private premises at No. 11, Fell Street, Wood Street, and was used not only by the workmen on the spot, but, with the consent of the owner, by a large number of persons in the neighbourhood. The water, as it issued from the well, was clear, odourless, and sparkling, and of a cool temperature, conditions which had deluded the public into the belief of its wholesomeness. A chemical analysis, however, dispelled the illusion rather forcibly, since it was one of the very worst specimens he had ever examined, containing, as it did, sewage in alarming proportions. The following were the details, viz:—The total solids, consisting of carbonates and chlorides, but chiefly sulphates, amount to 123 grains per gallons, as against 17 grains in

New River water. The chlorine reached the high point of 10·4 grains per gallon, as opposed to 1·2 grains per gallon of New River water. Free ammonia existed to the enormous extent of 32·80 parts per million, as against 0·03 parts per million in the New River water. The albuminoid ammonia, which was the direct expression of the deadly organic matter, reached the point of 0·52 parts per million as against 0·06 parts per million in New River water. It was hardly possible to find a worse potable water, and comment would be superfluous. He had, therefore, to ask the formal order that the well be forthwith closed, and a notice attached to the pump, stating that it had been disused by their authority, upon the ground of the water being dangerous for domestic purposes. The owner of the well had given him his assurance in writing that he would offer no opposition to that course. The recommendation of the medical officer was immediately adopted.

CHELSEA WATER-WORKS COMPANY—MOLESEY WORKS.—By an Act of Parliament obtained during the past session, this company were empowered to construct (half a mile below Sunbury lock) additional works at West Molesey, consisting of a new intake, the erection of engine and boiler houses, and two 40-horse power engines; to make four subsidence reservoirs (together, to contain 140 million gallons); and to lay a cast-iron pipe, five miles in length and 36 inches in diameter, to convey the water from West Molesey to the existing filter-beds at Seething Wells. The first section of the new works—viz., the new intake and the cast-iron pipe—is now completed, and the water taken from the Thames at West Molesey, so that the objectionable water from the Mole is avoided. The work of laying the new iron pipe was commenced in July last, and completed in the most satisfactory manner, by Messrs. Aird and Sons, in the short space of five months. The main is laid through West Molesey, East Molesey (under the Mole and Ember Rivers), Thames Ditton, and Long Ditton, to the existing filtering-works at Seething Wells. The subsidence reservoirs at the intake are to be of enormous size. When finished, the water surface of the four reservoirs will constitute an area of 35 acres. They will probably be completed before the summer of 1877. The total cost of the new works will amount to about £200,000, including the purchase of land at West Molesey to the extent of 50 acres. The works of the company, when these extensions are completed, will, no doubt, be most perfect; for with such a large storeage, it will not be necessary to take the water from the Thames when flooded. The total weight of the new main now laid is nearly 5000 tons.

MALTA AND MEDITERRANEAN GAS COMPANY (LIMITED).

The Ordinary General Meeting of the Shareholders in the above Company was held on Tuesday, the 27th of June, at the Offices, 60, Gracechurch Street—Mr. J. B. PADDON, the chairman of the company, presiding.

The SECRETARY (Mr. E. P. Rowsell) having read the notice convening the meeting, the following report was taken as read:—

The directors submit the accounts of the company for the year ending the 31st of March last.

The balance of revenue will allow, after payment of interest on debentures and dividends of 7 per cent. and 7½ per cent. respectively, on the first and second preference shares, of a dividend of 2 per cent. on the ordinary capital, free of income-tax.

During the past year the old rates for gas at Malta and Corfu have been resumed, and principally owing to this circumstance, but also in a measure to the continued cheapness of petroleum, the receipts for gas at Malta and Corfu are not equal to those of the previous year.

At the Sicilian stations an improvement is manifest.

The director retiring by rotation is Mr. John Romanes, who offers himself for re-election.

General Balance-Sheet, March 31, 1876.

Dr.				*Cr.*			
Capital: ordinary shares—				Preliminary expenses (balance)			
£5 per share on 15,000 shares	£75,000	0	0		£193	0	2
Less discount on shares authorized, 1868	3,000	0	0	Outlay at the stations, as per last balance-sheet	133,840	14	7
	£72,000	0	0	Expended since	727	3	0
Preference shares—				Suspense account	368	2	0
£5 per share on 6000 1st preference shares (7 per cent.)	30,000	0	0	Commission on debentures (balance)	102	10	0
£5 per share on 1454 2nd preference shares (7½ per cent.)	7,270	0	0	Furniture, London office	94	15	1
£1 per share on 1429 ditto	1,429	0	0	Goods in transit	718	12	10
Loans on debentures	44,350	0	0	Sundry debtors	7,447	17	8
Sundry creditors	1,159	10	9	Bills receivable	1,100	0	0
Bills payable	2,449	6	7	Stocks	14,559	9	10
Reserve-fund	1,124	12	11	Cash	3,550	11	6
General revenue	2,920	6	5				
	£162,702	16	8		£162,702	16	8

Profit and Loss, for Twelve Months ending March 31, 1876.

Coal	£7,214	0	7	Gas	£18,586	9	1
Gas-making (salaries and wages)	2,358	11	7	Coke	2,722	10	6
Charges on street lights	1,083	14	9	Tar	107	8	11
Wear and tear	1,138	0	11	Meters and fittings	221	5	5
Purifying materials	141	7	5	Stock	177	8	5
Rents	66	18	5	Transfer fees	3	10	0
General trade charges	791	18	11				
Bad debts and allowances	82	13	10				
Treasurer's commission at stations, and audit fee at Malta	263	19	4				
Preliminary expenses	193	0	2				
London expenses	1,058	4	3				
Law expenses	32	9	9				
Commission on shares	11	1	0				
Exchange	569	0	0				
Interest and discount	29	8	4				
Income-tax	1	15	0				
Interest and dividend account	6,982	8	1				
	£21,818	12	4		£21,818	12	4

The CHAIRMAN, in moving the adoption of the report and accounts, said: Gentlemen, I shall not have to detain you very long to-day. I may say that the accounts now before us strongly corroborate a description which I gave of this undertaking on a previous occasion. I then pointed out that the increased profits which were so much needed would have to come from increased trade, for the concern was already so fairly well managed that further economies or better working could not be reckoned upon, and that the expected reductions in the price of coal would only be commensurate with the unavoidable reductions in the price of gas. The accounts show us that, practically, no increase of business has taken place, and therefore, as a direct consequence, the profit remains at about the same amount as for last year. It would, indeed, appear that, in comparison with last year, a decrease of business had taken place, but that is not so, as I shall presently show. With regard to the stationary condition of the company's business, the cause is twofold. First, the advance in the price of gas rendered necessary by the late increased cost of coal. Next, the cheapness of petroleum. With regard to the first, I hope we have seen the worst of it, as the old prices have been resumed, and the falling-off of consumers checked, and, it is hoped, stopped. But there is no doubt that petroleum is a formidable competitor, and where safety and convenience are of no great consideration, it will continue to be used. It is, however, fortunate for us that where people can afford to pay for the superior advantages of gas, there is not much danger of its being superseded by petroleum. Our managers also complain very much that the depression of trade, which is so great here, is much felt at each of the stations. Of course this tells upon us, and will, with what has been stated, sufficiently account for the absence of increased rental. Nothing will more clearly show the condition of the company's business at the various stations than a comparison of the respective quantities of gas sold. A summary of these figures show that while there has been a loss at the Malta stations and at Corfu, that loss has been made up by the increase at the Sicilian stations, and that the total quantity of gas sold last year was a small per centage over the quantity sold in the year preceding. From 1873 to 1874, there was a decrease, but that decrease has evidently been arrested. With regard to the Sicilian stations, I may say that the time has passed for considering them sources of loss to the company. At Trapani the improvement is clear, and promises steadily to increase; at Marsala there is also an improvement, but the negotiations with the Municipality for the clearing up of arrears and other matters, are still incomplete, and not very satisfactory. The directors hoped to have made a satisfactory report to you respecting them at this meeting, and they regret not being able to do so. But they still hope, before long, to place the company's affairs at Marsala on a better footing. The accounts will admit of a few explanatory words. There has been a slight alteration in the form, which it is hoped will be approved of. Beginning with the capital account, it will be seen that the differences between this statement and that for last year are not very great. No increase has been made on the debenture loan account; but some £1340 has been added to the second preference account. The disposal of this amount is shown upon the opposite side, where the most conspicuous item is £727 additional capital expenditure. It would have been more satisfactory to the directors if no such charge had been made, for they feel strongly that any addition to the present capital is undesirable, and should only be made when absolutely unavoidable. In all other respects the balance-sheet is very plain, and does not require comment. In comparing the revenue account with that of the preceding year, there is a decrease in the net cost of coal (deducting residuals in each case) of £1583. But there is a decrease in the rental of £1248, and an increase in the item of exchange of £114, so that only a sum of £221 finds its way to the resulting profit. Of the other revenue items, I need only say that their total is slightly less per 1000 feet sold than for last year; indeed, they contribute a further small sum to the total profit, which is £244 more than in the accounts for last year. Perhaps the less I say respecting the future the better; but I do hope, with some confidence, that good will come of the efforts of the directors to increase the business of the company. On behalf of the current year, an advantage has already been obtained from the late fall in price of coals. An increase of trade would but slightly increase our standing expenses, and as all additional profit would go directly to the ordinary shares, it is quite possible our affairs may bear a considerably improved complexion by the time of our next meeting. I will now move—"That the report of the directors, together with the balance-sheet, be approved and adopted."

Mr. S. ANDREWS, a director, formally seconded the motion.

A SHAREHOLDER: Can you tell us whether the theatre at Malta, which was burnt down, will soon be rebuilt? Its being closed is, no doubt, a source of great loss to us.

The CHAIRMAN: I am sorry to say that the loss of the theatre was a heavy blow to our business. Its rebuilding is in progress, and undoubtedly at some time it will be of very great benefit to us. Our manager over there, however, is of opinion that it will not be finished till the end of next year, so we must leave that out of account as regards the profits of the current year.

Mr. HAWKINS inquired what rate of interest was paid on the company's debentures. He gathered from the accounts that it was about 7 per cent., which he considered too high. He also thought the London expenses—£1058—too much for such a small concern, and asked whether some reduction could not be made.

The CHAIRMAN, in reply, said he was afraid that persons taking up the company's debentures looked more to their present than to their future prospects. He might say that the interest varied a little. The debentures were continually falling due, and either being paid and transferred or renewed. The amount was practically the same in both accounts, but the interest varied from 6 to 6½ per cent., and on some they paid a little more. Some of these debentures carried a commission with them when "placed" through professional agency, and that was as much a charge upon them as interest. He was happy to say, however, that the interest was nearer 6 than 7 per cent., and since the present accounts were made up there had been an improvement. With regard to the London expenses, he did not know how they could be reduced. They looked a good deal by themselves, but, in comparison with other concerns, the board were of opinion that they were rather small. The amount covered the whole expenses of office rent, and of a great many items.

Mr. HAWKINS asked what was the meaning of the item £260 commission at stations.

The CHAIRMAN said it was commission to the treasurer, and those who received and forwarded the money, but it was chiefly banking commission. The expenses of the company were not dependent on its profits, and the only item it would be possible to deal with would be the directors fees. It so happened that the directors had not so easy a task to perform when profits were small as when they were large; but if it appeared that their fees were too large, the shareholders could pass a resolution on the subject. (No, no.) The London expenses consisted, first, of the directors fees, the payment of the officers in London, office rent, stationery, and other expenses, &c. He then put the resolution for the adoption of the report, &c., and the motion was carried unanimously.

The CHAIRMAN then moved resolutions (all of which were carried) declaring the dividends in accordance with the recommendation in the report, and then referred to the director retiring from office, Mr. Romanes.

Mr. HAWKINS inquired whether it was necessary to fill up the office. He thought three directors were quite enough for such a small undertaking.

The CHAIRMAN, in reply, said there used to be five directors, and there were now only four, and he feared if that number were reduced it would be prejudicial to the company's interests. The payment to the directors was a fixed sum, so there would be no difference, even if the number of directors were reduced. He could speak of Mr. Romanes as a very valuable colleague, and a gentleman whom they would all be sorry to miss at the board, and his absence would recall a great many obligations they were under to him. He concluded by proposing his re-election.

Mr. STOKES, a shareholder, seconded the resolution, which was carried *nem. con.*

Mr. ROMANES having briefly returned thanks,

Mr. BACKLER proposed that Mr. Daniell and Mr. Hersee should be the auditors for the next year. His own engagements were increasing, and rendered it necessary that he should resign his position as one of the auditors of the company. In recommending Mr. Hersee, he mentioned that he was the secretary of the Oriental Gas Company, and of another company carrying on its operations abroad, besides being the auditor of the Continental Gas Company. He was thoroughly well versed in all accounts, and he (Mr. Backler) felt that he was doing the company a service in recommending him as one of the auditors.

Mr. WHITE having formally seconded the resolution,

The CHAIRMAN said he was not altogether taken by surprise at what Mr. Backler had just said, although that was the first intimation he had had. So far as the directors were concerned, they would always look back with pleasure and some gratitude to Mr. Backler for the way in which he had conducted the business of the company falling to his hands, and he was quite sure that the

proprietors had every reason to think of him in the same way. In a professional point of view, Mr. Backler was a most accomplished man, and business had been made very pleasant through his means. They felt indebted to him for having placed such a distinguished name before them, and the directors would gladly acquiesce in Mr. Hersee's election, if the meeting appointed him.

The resolution was carried unanimously.

Mr. HERSEE having returned thanks,

The CHAIRMAN proposed the usual remuneration of 20 guineas each to the auditors, and the motion was seconded, and carried unanimously.

Mr. STOKES then moved a vote of thanks to the chairman and directors. From what the chairman had told them that morning, there were much brighter days coming. He hoped that the cleanliness and the other advantages of gas would override the cheapness of petroleum, and that they would soon see the consumption of the company's gas improve.

Mr. HAWKINS seconded the resolution, which was put and carried.

The CHAIRMAN returned thanks. They were, he said, always glad to receive such votes of thanks, and they would continue to devote their best efforts to promote the interests of the company.

The meeting then separated.

PERTH GAS COMMISSION.

The Annual Statements of the Account of the Gas Commissioners have just been published. They are as follows:—

Dr. *Revenue and Expenditure, from April 30, 1875, to April 30, 1876.* *Cr.*

Coal account			£4,323	7	0		
Lime ditto			184	19	8		
Wages and salaries			2,220	9	5		
Miscellaneous repairs and charges			408	17	11		
Meters and furnishings			59	4	8		
Stores, tools, and sundries			55	16	11		
Main and service pipes			570	3	6		
Feu duties and taxes			533	14	2		
Incidental charges			59	18	2		
Stationery and printing			24	7	11		
Annuities—Martinmas, 1875, and Whitsunday, 1876			2,812	10	0		
Interest account			386	19	0		
Sum required by Act to be set apart annually as a "sinking-fund" towards the payment of borrowed money			500	0	0		
Contingency and depreciation of works fund			200	0	0		
Sum towards reduction of preliminary and parliamentary expenses			483	4	1		
Sum towards bad debts			50	0	0		
Surplus to be carried forward to next year's accounts			1,540	17	5		
			£14,414	9	10		
Gas and meter rental						£11,678	2 5½
Off discounts						486	9 9½
						£11,191	12 8
Naphtha work*						786	5 5
Tar account						93	1 0
Coke ditto						323	11 7
Rent of property						44	0 0
Add balance brought from last year						1,975	19 2
						£14,414	9 10

* This is the balance at credit of naphtha work account, on the year's working, after deducting the sum of £205 1s. 9d. paid for new iron roof for yard, boiler, and sulphate of ammonia pot.

Balance, April 30, 1876.

Gas establishment—cost price			£45,000	0	0		
Preliminary and parliamentary expenses			2,000	0	0		
Alterations and improvements on works			6,411	12	5		
Stores, tools, and sundries			771	1	6		
Coal account—stock on hand			76	7	0		
Lime account			17	3	7		
Arrears of gas-rental		£1,412	10	0			
Deduct sum at credit of bad debt account		113	16	10			
			1,298	13	2		
Naphtha work—stock on hand and accounts outstanding			310	19	2		
Arrears of tar and coke			37	1	9		
Property investment			709	1	3		
Rent of property			22	0	0		
Bank of Scotland (account current)			3,196	1	6		
Bank of Scotland (deposit account)			2,013	17	0		
Cash account—on hand			10	2	0		
			£61,874	0	4		
Gas annuitants, for amount of their several holdings in the Perth Gas Annuities+						£45,000	0 0
Borrowed money and interest thereon						11,217	19 4
Annuities, including half year to Whitsunday, 1876						1,393	4 8
Interest on purchase price of naphtha yard						6	0 0
Salaries—bal. due thereon						177	5 0
Sundries for coal, lime, &c.						238	13 11
Add sums taken from revenue required by Act to be set apart annually as a "sinking-fund" towards the payment of borrowed money						2,000	0 0
Add contingency and depreciation of works fund						300	0 0
Revenue account—Balance due thereon						1,540	17 5
						£61,874	0 4

+ This is the amount of the capital stock of the late companies, upon which the commissioners are bound to pay perpetual annuities at the rate of 6¼ per cent. per annum, and it is here retained at that amount to meet the book value of the "Gas establishment" *per contra*.

Estimated Revenue and Expenditure for the Year, from April 30, 1876, to April 30, 1877.

Coal account—4500 tons, at average price, 18s.			£4,050	0	0		
Lime ditto			185	0	0		
Wages ditto			2,220	0	0		
Miscellaneous repairs and charges			400	0	0		
Meters and furnishings			60	0	0		
Main and service pipes			300	0	0		
Feu duties and taxes			540	0	0		
Incidental payments			60	0	0		
Printing and stationery			25	0	0		
Annuities			2,812	10	0		
Interest account			390	0	0		
Sum required by Act to be set apart annually as a "sinking-fund" towards the payment of borrowed money			500	0	0		
Contingency and depreciation of works fund			200	0	0		
Sum towards preliminary and parliamentary expenses			500	0	0		
Surplus to be disposed of as may be resolved on			233	6	11		
			£12,505	16	11		
Balance from 1875-6						£1,540	17 5
Gas and meter rental—40,350,000 cub. ft., at 4s. 7d. per 1000			£9,246	17	6		
1,000,000 cubic ft., at 5s. 5d. per 1000			270	16	8		
Rent of meters			480	0	0		
			£9,997	14	2		
Off 10 per cent. discount on 16,000,000 cubic feet			366	14	8		
						9,630	19 6
Naphtha work						900	0 0
Tar receipts						90	0 0
Coke account						300	0 0
Rent of property						44	0 0
						£12,505	16 11

CHELSEA WATER-WORKS COMPANY.

The Half-Yearly General Meeting of the Governor and Company of Chelsea Water-Works was held at their Office, Commercial Road, Pimlico, on Thursday, the 29th of June—Mr. J. DEEDES, the Governor, in the chair.

The SECRETARY read the notice convening the meeting, and the minutes of the ordinary general meeting held on the 23rd of December last; and, after reading the certificate of the Government auditor, and the report of the company's auditors, as to the correctness of the accounts, he read the directors report, as follows:—

The certified accounts for the half year up to the 31st of March last, are laid before the meeting; copies having been forwarded to the proprietors, as usual, with the notice of the meeting.

The moneys received on account of capital, in the financial year up to the 31st of March last, amounted to £167,943, showing, with a cash balance of £8446 7s. 6d. in hand on March 31, 1875, a total credit of £176,389 7s. 6d. There has been expended in the same period, on capital works, the sum of £105,362 12s. 5d., and £40,400 in the payment of the company's bonds, and there remained, on March 31, 1876, a cash balance of £30,626 15s. 1d. to the credit of the account. The total capital expenditure amounting at that time to £1,027,073 4s. 11d.

The gross water-rental, for the financial year, amounted to £91,500 (as against £83,404 in the preceding year) and the working expenses, including the sum of £1117 12s. 2d. for repairing the Putney Aqueduct, amounted to £29,364 (as against £28,842 in the preceding year). The dividend and interest account for the financial year is charged with the further sum of £3952 18s. 10d. for interest and additional dividends accrued on the preference and debenture stocks. The result of the year's business, after providing for the dividend on the ordinary stock at the usual rate, is a surplus of £6707 19s. 1d. in favour of the revenue account, and there remained at the close of the account on the 31st of March last, the sum of £44,857 8s. 2d. in assets available for dividend on the ordinary stock of the company.

At the special meeting of proprietors in October last authority was given to the directors to raise, for the purposes of the new works, under the powers of the company's Act, 1875, the sum of £160,000, as perpetual 4½ preference stock; the stock to be issued at such time or times as the directors should deem expedient. They accordingly issued, in November last, the sum of £80,000, and it is estimated that the second portion of the same stock and of the same amount will be required to be issued in November next.

It was reported to the proprietors, at the ordinary meeting in December last, that the important work of laying the new 36-inch pumping-main, from West Molesey to the filtering-works at Seething Wells, had been completed, and the new intake made available on the 11th of that month. The construction of the new storeage reservoirs is progressing favourably, under Messrs. Aird's contract, and the engine and boiler houses and permanent pumping machinery are also in a forward state. Considerable benefit was derived, during the last winter floods, from the use of the new Molesey main, and there is every reason to believe that, when the storeage reservoirs shall be completed and in use, the water supply from the new intake will be at all times satisfactory.

The whole of the company's works, buildings, and machinery are reported by the engineer to be in excellent order.

The quantity of water pumped from Kingston during the year was 2822 million gallons, being 88 millions less than in the preceding year; and, seeing that the number of supplies is gradually increasing, and that the water supplied in bulk, through meters, is substantially the same as in the preceding year, the saving of water is due, doubtless, to the improvement in the tenants fittings, under the requirements of the company's "waste inspectors."

It appears from the engineer's reports that, out of 28,675 places (including houses, stables, factories, and trades) supplied with water by the company, nearly 17,000 houses have been visited, and that in 8532, waste was discovered and traced to imperfect fittings. In each of these cases the owners or occupiers were required, by notice, to repair the fittings or substitute others, and the company's requirements have been complied with in 7952 of these cases. It is intended that the inspection shall be kept up, and the district revisited from time to time, when the first general inspection shall have been completed. The directors have therefore much satisfaction in reporting that this inspection has been attended with considerable success.

During the year, 2004 yards of additional mains and service pipes, varying from 3 to 9 inches in diameter, have been laid for extensions in the district; 250 new supplies have been laid on, and 117 houses pulled down, leaving a net increase of 133 new supplies.

The report to the proprietors in December last stated that the Corporation of the City of London, in conjunction with the Metropolitan Board of Works, had in view the introduction of a bill to alter the basis on which the company's rates are charged, and to enable persons to require to be supplied with water by meter; and that another bill was in contemplation, proposing to transfer the company's powers, property, and duties to a Royal Commission. Neither of these measures has been proceeded with during the present session of Parliament.

The proprietors will have observed that a select committee of the House of Commons has been appointed to inquire into the constitution and efficiency of the Metropolitan Fire Brigade, and into the best means of providing security from loss of life and property by fire in the Metropolis. The evidence taken by the committee up to the present time has relation, for the most part, to the constitution, duties, and expenses of the brigade. Meanwhile, the companies have been engaged in collecting such statistical information as may be required by the committee on the subject of water supply at fires.

The directors recommend that a dividend for the half year at the rate of 6 per cent. per annum upon the ordinary stock be now declared, and paid, as usual, on the 5th of July prox.

Dr. *Revenue Account for the Half Year ended March 31, 1876.* *Cr.*

Maintenance—							
Maintenance and repair of impounding and service reservoirs, filtering beds, works and pipes, or for obtaining and storing of water including the cost of materials and labour			£316	13	2		
Maintenance and repair of mains, pipes, fittings, meters, and works connected with the distribution of water, including the cost of materials, labour and renewals			2,609	5	7		
Pumping and engine charges, including cost of coals, wages, &c.			3,325	5	7		
Filtration, including the cost of materials and labour			518	1	6		
Salaries of engineer, inspector, superintendent, and clerks, and wages of turncocks			1,646	8	3		
Thames Conservancy			500	0	0		
Rates and taxes, exclusive of income-tax			2,126	7	4		
Management—							
Allowance to directors			508	6	8		
Allowance to company's auditors			40	0	7		
Salaries of secretary, accountant, and office clerks			826	19	7		
Superannuation of servants of the company			321	14	4		
Commission to collectors			988	5	3		
Stationery, printing, & general establishment charges			501	10	3		
Law and parliamentary expenses			287	3	11		
Official auditor and water examiner			54	4	2		
Dividend and interest account for transfer of profits			29,127	13	0		
Balance carried to next account, to provide for losses			2,000	0	0		
			£45,697	19	2		
Balance brought from former account						£2,000	0 0
Less sums written off as losses—viz.:							
Empty houses, houses cut off, and bad debts						1,351	3 9
						£648	16 3
Water-rents accrued to date of this account						44,725	7 7
						£45,374	3 10
Rents of houses and lands accrued to date, and owing to the company						316	0 4
Fees received for registration of stock, transfers, &c.						7	15 0
						£45,697	19 2

Statement of the Liabilities and Assets (Balance-Sheet) on March 31, 1876.

Capital account—							
Amount received			£1,057,700	0	0		
Revenue account (provision for bad debts)			2,000	0	0		
Dividend and interest account			44,857	8	2		
Dividend on preference stock			3,791	14	2		
Interest accrued and provided for to date			2	2	2		
Unclaimed dividends			3,470	8	2		
Contingency-fund			17,699	13	8		
Outstanding tradesmen's accounts owing by the company			3,570	4	10		
			£1,133,091	11	2		
Capital account—							
Amount expended for works						£1,027,073	4 11
Contingency-fund						17,699	13 8
Water-rates due to the company						32,821	15 7
Outstanding accounts owing to the company						691	19 2
Stock in hand—							
Pipes, meters, fittings, and general stores						4,362	18 10
Cash deposited on interest						45,000	0 0
Cash at bankers						£6,159	1 10
Less outstanding cheques						717	2 10
						5,441	19 0
						£1,133,091	11 2

The CHAIRMAN then moved—"That the directors report be received and

adopted, and entered on the minutes." In doing so he said: Gentlemen, I hope I may ask of you to consider the report a favourable one. We think it quite so, and one or two remaks which I will make on some of the items in it, will, I think, bring you all to the same conclusion. First, gentlemen, as to the improvement in the water-rental. The gross rental for the year ending March 31, 1876, is £91,500. For the preceding year it was £83,404, showing an increase in the water-rental of £8096. Then as to the working expenses. To the 31st of March, 1876, they were £29,364. For the preceding year they were £28,842, being less by £528. But in this year we have had a charge of an unusual nature, amounting to £1117 in repairs to our Putney aqueduct. That was an unusual call on us, and if it had not been for that call, the whole of which is charged against the working expenses of the year, the balance would have been considerably the other way. Therefore, I think we have reason to be satisfied that, adding that unusual charge, the increase of expenses is not more than £522, while the exceptional outlay has come to £1117. Then, again, as to the dividend and interest account. That account is charged in the year for interest and additional dividend on the preference and debenture stocks, with £3952. That is an additional outgoing and charge against the company, which, of course, they have had to meet; but yet the whole year's business gives a surplus in favour of the revenue account of £6708. I cannot think but that that is a satisfactory result, and it leaves us, as explained by the Government auditor, the sum of £44,857, applicable to dividend on the ordinary stock. Well, gentlemen, let us look at that figure for a moment. The balance applicable to dividend to March, 1875—for that year—was £38,149, whilst the balance applicable to March, 1876, is £44,857, showing an increase in this year of £6708. It is mentioned, as a probable circumstance, that £80,000 more capital will have to be raised in November. No doubt, the meeting is well aware how that matter stands. We had power, under our Act of 1875, to raise £160,000 in stock or shares, and also a loan power granted to us under the same Act of acquiring £40,000 in that way, making altogether £200,000, entirely applicable to our new works, which are still going on, and the estimated cost for which is £200,000. I am happy to say that the progress of those works has been favourable. There has been untoward weather, and, at times, there was great difficulty in consequence of the great influx of water. The progress of the works, however, has been favourable, and the contractors have been and are hurrying, as much as possible, the completion of the engine and boiler houses, and the permanent pumping machinery at the new Moulsey intake. We are very anxious to get that completed before the winter comes on again, so that that part of the works at Moulsey may come into use for next winter. The completion of the storeage and subsidence reservoirs must, of course, take a longer time. We do not expect, speaking widely, that they can be completed before, probably, the middle of next year. Then I think the proprietors will approve of what has been done with regard to the waste inspection. Now, we consider, and I think it must be admitted, that a very great advantage indeed has resulted from that waste inspection. Let me give you a short history of it. Seventeen thousand houses have been inspected for the purpose of seeing whether there was waste, and whether their fittings were right and proper or not. Of these, 8532 were found to incur, if I may use the word, waste of water from imperfect fitting. In 7952 cases the defects have been made good, and that number surely would very considerably account for the smaller quantity of water pumped during the last year. It has been mentioned in the report, that two bills were shadowed forth—one, to alter the basis on which the company's rates are charged, and to enable everybody to require to be supplied by meter, and the other, proposing to transfer the company's powers, property, and duties to a Royal Commission. Well, gentlemen, neither of those bills has been proceeded with. As to the matter mentioned in the report with regard to the Metropolitan Fire Brigade, our solicitors have been carefully watching the proceedings of the select committee from time to time, and if they should come by-and-by to call on the company for a statistical account, or report of any kind, we shall be ready with it. At present, the inquiry has been on matters of hydrants and engines, and things of that sort. All that has been said about the companies has been favourable, and Captain Shaw has stated that, on all occasions, he has found the water companies ready to give every assistance in case of fire, and has spoken of them as highly as he could. I now beg to move—"That the directors report be received and adopted, and entered on the minutes."

Major BOILEAU (a shareholder) seconded the motion, and, in doing so, said the directors had conducted the company's affairs very ably, and he was quite sure that the hope of the chairman—that the report would be considered satisfactory by the shareholders—would be realized. If they had examined the accounts, even without the chairman's remarks, they would have been satisfied. The great feature of satisfaction was the balance available for dividend. They had now no less than £44,000 odd, while last year they had only £42,000, and that spoke for itself, without any comment on his part. The directors, he thought, deserved warm praise for the efforts which they had taken to correct waste of water. When they saw that the enormous quantity of 88 million gallons of water had been saved by examining the fittings, it showed how very much they lost last year by imperfect fittings, and much praise was due to the directors in effecting such a great saving. The quantity of water he had mentioned had been saved, and the expenses had also been saved, inasmuch as the water supplied had been less.

The CHAIRMAN: Before I put the motion, will you allow me to supplement the statement I made just now? I wish to read a suggestion made by Major Frank Bolton, which we propose to send to all our customers. He says: "The water delivered for domestic purposes by the metropolitan water companies is frequently deteriorated, after leaving the water companies mains, by the dirty state of the cisterns on the premises of the consumers; all cisterns should, therefore, be frequently cleaned out, and every care should be taken to prevent the contamination of the domestic water supply after delivery." The chairman then put the resolution for the adoption of the directors report, &c.

A SHAREHOLDER thought the report was extremely satisfactory, but the capital had very much increased, although he admitted the revenue account had also increased.

Another SHAREHOLDER, in reply, pointed out that the amount available for dividend on the ordinary capital was after providing for the dividend on the preference stock, and

The CHAIRMAN also observed that the provision was larger than it had been from time to time.

The report was unanimously adopted.

Major BOILEAU said he desired to call attention to a circumstance which deserved notice. The shareholders must not forget that the company were in a very prosperous state, and he was satisfied that they would all feel to whom the improvement in their affairs was due. Many of them, a few years ago, remembered a very different state of things, which, however, had been gradually improved. The directors had done all in their power to watch over and promote the shareholders interests, and the proprietors would derive still greater benefit from the Act of Parliament which the directors had obtained, which was a work of very considerable labour. The directors had also done very much to improve the water, and it was through the exertions which they had made that they had nearly completed the new intake, from which they had already derived great benefit; and the shareholders might look forward in future to greater prosperity, and greater satisfaction on the part of the public for the Chelsea water. He conscientiously felt that he might ask the meeting to go with him—seeing the prosperous state of the company, and the exertions which the directors had made to bring about such a condition of affairs—in proposing that the directors remuneration should be increased, from Midsummer, 1876, from £1000 to £1200 a year.

Mr. TOWER briefly seconded the motion, observing that it was unnecessary for him to add anything to what the proposer had said.

The CHAIRMAN, in reply to a question, said there were nine directors.

A SHAREHOLDER said he really thought the salaries paid to the directors of water companies were not calculated to make them so particularly attentive as they might be, although he was quite sure that the directors of the Chelsea Water Company paid the greatest attention to the shareholders interests. The increase proposed, however, he thought exceedingly small, and he should have been inclined to ask for a much larger sum, for he thought it was quite inadequate.

Major BOILEAU then put the motion, which was at once carried unanimously.

The CHAIRMAN, in returning thanks, said he was sure the directors would all feel very much flattered at the compliment paid them. He could not say he thought that they would devote more time and attention to the affairs of the company than they had done; because he was sure he could say for his colleagues that they had been ever ready to give their full time and attention to the affairs of the company. He considered the compliment was also a vote of confidence in them. He then, continuing, moved the following resolution:—"That the accounts, as laid before the meeting, be received and entered on the records."

The motion having been carried unanimously.

The CHAIRMAN briefly moved, separately, the following resolutions:—"That the directors be, and they are hereby authorized to set apart and pay so much money on the 5th day of July next as will be sufficient to discharge the dividend which will become payable on that day upon the preference stocks;" and "That a dividend for the half year at the rate of £6 per cent. per annum on the ordinary capital stock be now declared, and paid on the 5th day of July next to the several persons and corporations who are proprietors of such capital stock."

The resolutions were carried unanimously, and

The CHAIRMAN then said there were three directors retiring by rotation, and they offered themselves for re-election. The retiring directors were Messrs. Yatman, Bodkin, and Hyde. The two former gentlemen were present, but he was sorry that Mr. Hyde was prevented from being with them through severe illness. He then moved a resolution for the re-election of the three gentlemen named.

The motion was carried unanimously, as was also another re-electing Mr. Westwood auditor.

Major BOILEAU, who expressed himself rather diffident in coming forward again, then briefly moved a cordial vote of thanks to the chairman and the directors for their attention to the company's affairs, and for the manner in which the chairman had conducted the business of the meeting that day.

Mr. PRICE seconded the motion, which was carried unanimously, and

The CHAIRMAN having replied, expressing the thanks of the directors generally, the meeting separated.

BRITISH ASSOCIATION OF GAS MANAGERS.

(*Continued from page 988 of vol. xxvii.*)

TUESDAY, JUNE 13.

Mr. C. HUNT, of Birmingham, read the following paper on

WASHERS OR SCRUBBERS.

The comparative merits of washers and scrubbers have formed the subject of frequent discussions, both at the meetings of this Association and elsewhere, resulting, it is hardly too much to say, in a growing feeling of preference for the former. Whether, however, this preference is altogether well founded, or whether the two forms of apparatus may not with advantage be used conjointly, seems to be still so far an open question, that probably a few further remarks upon the subject may not prove wholly unacceptable to this meeting.

By the term washer is generally understood that form of apparatus in which contact between gas and liquid is obtained by forcing the former through a number of seals of indeterminate depth, the same process of washing being effected in a scrubber by means of a large area of a wetted surface. The retention of the name of "scrubber" is probably useful, chiefly as serving to indicate the kind of method employed, since it can hardly be said to have any significance, except where such a vessel is used solely for the retention of tarry matter.

It has been claimed for the washer that it is cheaper in its first cost and cost of working, occupies less space, and is more efficient in removing other impurities, together with ammonia. The advantage which it possesses over an ordinary coke scrubber, in its freedom from all liability to choke up, is beyond dispute.

At the outset it is to be observed that nothing is much more easy than to take out the bulk of the ammonia from foul gas, provided the latter be sufficiently condensed, in illustration of which I may refer to one or two methods in use at the present time. One of the best with which I am acquainted is that introduced some years ago by Mr. Hugh Young, when engineer to the late Birmingham and Staffordshire Gas Company, which is doubtless well known to many gentlemen here present. It consists simply of a rectangular vessel, say 24 feet in height, by 8 feet by 16 feet, water being pumped over and over until the required strength is obtained, and distributed in a series of small jets, striking with considerable force upon a dash-plate placed underneath each jet, the effect being to fill the vessel with fine spray. Originally the interior was left entirely open, but recently it has been found that by partially filling them with thin boards, their efficiency is considerably increased. At one of the works under my charge, where the maximum production is about 2,000,000 cubic feet per diem, two of these scrubbers are found to remove all the ammonia to within about 7 per cent. of the total quantity; that is to say, taking the total as = 100, the proportion removed

By condensation.	=	46·6 per cent.
By scrubbers	=	46·6 ,,
Leaving to be removed	=	6·8 ,,
Total		100·0

the resultant liquor having a strength varying from four to seven ounces.

At the Windsor Street works, purification from ammonia is completely effected by means of two scrubbers, the first being 20 feet in diameter by 40 feet high, and, when erected, fitted with four shelves sloping inwards and outwards alternately, as shown on the diagram, so as to break the passage of the descending liquor and ascending gas. At the present time the two top shelves are removed, and the space filled with thin boards; but the results of which I am about to speak were obtained before this alteration was made. Through this vessel the whole of the make, up to nearly 4 million cubic feet per diem, is passed on to the second or finishing scrubber, which is also 20 feet in diameter, but 60 feet high, and of the kind known as Mann's. The liquor from this, mixed with that from the hydraulic main and condenser, is pumped over the first scrubber at the rate of from 7000 to 10,000 gallons per hour. The quantity and strength of the liquor made in the second scrubber being known, as also the strength of that from the hydraulic mains and condenser, I am

able, from the return of liquor made for sale, to gauge the results at each successive step, and they are as follows:—

Ammonia removed by condensation . . .	42·7	per cent.
" " 1st scrubber . . .	43·3	"
" " 2nd scrubber . . .	14·0	"
Total	100·0	

I am, of course, assuming the entire absence of ammonia in the outlet gas, and this is practically the case.

The higher strength of the liquor in this instance—ten ounces—probably accounts for the larger quantity of ammonia remaining to be removed by the second scrubber.

Here, then, are two examples of simple and comparatively inexpensive plant, effective for the removal of the bulk of the ammonia, and occupying very little space. In both cases there is, of course, the cost of pumping to be taken into account; but I may mention, as a small set-off, the fact that neither vessel throws the slightest back pressure, while the whole of the tar remaining in the gas after condensation is effectually removed.

So far as I am aware, washers have not hitherto been employed to any extent for the final process of removing the last traces of ammonia, although there seems to be no reason why they should not, and a few weeks ago I had an opportunity of inspecting a new form of washer designed by Mr. Saville, of Sowerby Bridge, alluded to by the president in his opening address, which has proved efficient for this purpose. Where, however, a large quantity of ammonia remains to be extracted, the graduated series of steps leading up to clean water, which is necessary for the complete success of this somewhat delicate process, can only be obtained in a washer by adding to the number of seals through which the gas has to pass, thus increasing the back pressure to a degree which may fairly be considered objectionable. On the other hand, the coke scrubber, as a finishing vessel, can hardly be too highly commended, for although the extreme height adopted in some instances has attracted a certain amount of adverse criticism, it is impossible not to admit that a very high degree of efficiency has been thereby attained. By their use, practically speaking, absolute freedom from ammonia may be ensured, while the resultant liquor can be varied at will, and, according to circumstances, from 4 or 5 ounces strength up to 30 or even 40 ounces. I may say that the one I have, after three years of constant use, during which time the coke has not required renewal, works as freely as the day on which it was first started, the back pressure, with the whole of the water passing through, rarely, if ever, exceeding one inch. This is, of course, attributable to the thorough washing which the gas undergoes previous to entering the scrubber.

The extraction of ammonia, however, although the primary, is by no means to be regarded as the only duty of a washer or scrubber, since the process is capable of being rendered very effective for the removal of other impurities, notably CO_2 and H_2S. It ought, perhaps, to be looked upon as a settled principle in gas manufacture, that no ammonia should leave the works without bearing away with it its full burden of these gases, although it is probable that, under the most favourable conditions, not more than about one-fourth of the total impurities can be removed by its means. Mr. Livesey dealt fully with this question in the course of his paper read last year at Leeds, and I have only to say that my own calculations confirm his conclusions.

The next point for consideration then is, whether the washer or scrubber best performs this secondary, although highly important duty. With respect to this part of the subject, it is to be regretted that our sources of information are somewhat limited. One consistent advocate of the washer, however, has furnished us with evidence of a very practical nature, whatever may be the opinion formed as to its conclusiveness. In his exhaustive paper on gas purification, presented two years ago, Mr. George Anderson stated the results of an examination of the liquor obtained at the various stages of his process, which consists in first washing the gas, and finally passing it through a scrubber, the latter being supplied with clean water, and the liquor so obtained passed back to the washer, and mixed with that from the hydraulic main. This is precisely the same plan as that adopted by myself, except as regards the apparatus employed, my open vessel taking the place of Mr. Anderson's washer.

Mr. Anderson found that whereas the liquor from the hydraulic main had a strength of only 2½ ounces, and contained 160 cubic inches of foul gas per ounce, and that made by the scrubber was of 6 ounces strength, containing 179 cubic inches per ounce, the whole of the liquor produced, after passing through the washer, was brought up to a uniform strength of 14½ ounces, and contained 346 cubic inches of foul gas per ounce; the increase attributable to the washer being about 180 cubic inches per ounce. This no doubt speaks well for the washer, as compared with the scrubber employed in this particular instance, but it is evident that the latter can hardly have been a very favourable specimen of its kind, since it seems to have shown itself but little superior in its action upon the foul gases to the process of condensation carried on in the hydraulic main.

Good, however, as the result really is, it by no means equals what is capable of attainment by good washing, and falls far short of the capabilities of the scrubber in the same direction, so far as I have been able to observe their action. For instance, the liquor delivered from the Windsor Street works has been found to contain, on the average, 438·9 cubic inches of foul gas per ounce strength, and I am able from this, and from a knowledge of what are the results of the final process of scrubbing, to arrive at the fact that the open vessel alluded to as performing the office of a washer, brings up the whole of the liquor produced in the hydraulic main and condensers to contain 427 cubic inches per ounce strength. While two samples with which I have been favoured, produced by a washer, from clean water passed once through, yielded 446·1 and 453·1 cubic inches per ounce respectively.

Taking the case of the scrubbers strictly so called, Mann's removes 509·9 cubic inches per ounce strength. A scrubber, 6 feet in diameter, fitted with sloping shelves, and partially filled with large pebbles, clean water being pumped over and over, gave 526·8 cubic inches per ounce as the result of an examination of the liquor produced; while Young's comes out best of all, removing no less than 569·1 cubic inches per ounce strength.

The balance, therefore, of such evidence as I have been able to collect, is greatly in favour of a large area of wetted surface.

Appended to this paper are the details of the analyses, giving both measurement and weight of the foul gases in each case.

As to the comparative effect of scrubbing and washing upon the formation of sulphide of ammonium, and consequent removal from the gas of sulphur present in other forms than sulphuretted hydrogen, it is, perhaps, sufficient to observe that the test for efficiency in other respects must of necessity be the measure of efficiency in this, since the same conditions are requisite in each case—namely, intimate and prolonged or repeated contact between gas and liquid. As ordinarily employed, however, ammoniacal liquor can scarcely be said to exercise any perceptible influence in the way of reducing the sulphur compounds, which are usually driven forward by the superior affinity of CO_2 for the NH_3.

Upon the question of comparative economy, very little need, perhaps, be said. Undoubtedly, the first object to be secured is efficiency, and to obtain this, at the lowest possible cost, should be the next. At present, the highest degree of efficiency in regard to the extraction of ammonia is represented by those scrubbers, which, filled either with coke or thin boards, remove it to the last trace by water passed once through. Their exclusive use, however, is to be deprecated, not only upon economical grounds, but chiefly because it deprives the manufacturer of the active assistance in the work of purification of a very large portion of the ammonia produced. To make the most of such assistance, it is obvious that the first process which gas should be made to undergo after condensation is that of thorough washing with liquor from the hydraulic main. It is equally clear that such can be successfully conducted by the aid of very simple means, irrespective of the washer, strictly so called, and that, by means of a similar agency, nearly the whole of the ammonia can be easily and cheaply removed, in combination with a very large proportion of foul gases.

The extraction of the small residue of ammonia, which in the instances I have mentioned amounts to no more than 14 and 7 per cent. of the total quantity respectively, is by no means the easiest portion of the work to be performed, owing to the volatile nature of the substance with which we have to deal. As just pointed out, the scrubber is a most efficient instrument for this final process, the success of which depends upon the maintenance of a well-distributed supply of perfectly clean water over an area of contact sufficiently large to avoid the necessity of passing the water more than once through. From what is known, however, of the washer in various forms, there seems to be good reason for believing that it can be employed with excellent effect as a finishing or catch vessel, and when this is made more apparent, its superior economy will probably render its general adoption for this purpose only a question of time. In combination with methods such as those I have referred to, and as a substitute for the somewhat costly structures now in use, it is not unlikely that in the future there may be found for the washer a wide sphere of usefulness.

Analyses of Samples of Gas Liquor.

Description. Scrubber or Washer.	Strength.	Carbonic Acid per Gallon.		Sulphuretted Hydrogen per Gallon.		Total Foul Gas per Gallon.		Total Foul Gas per Gallon per Ounce Strength.		Remarks.
	Oz.	Grains.	Cu. In.	Grains.	Cu. In.	Grains.	Cub. In.	Grs.	Cub. In.	
Liquor delivered from Windsor St. Works	10·5	1638·0	3465·0	438·2	1143·5	2076·2	4608·5	197·7	438·9	
Washer	23·5	4168·78	8820·94	639·38	1665·01	4808·16	10485·95	204·6	446·1	Water passed once through
Ditto.....	16·4	3101·88	6563·43	333·35	868·09	3435·23	7431·52	209·4	453·1	
Mann's scrubber ..	10·0	1806·0	3821·0	490·0	1278·7	2296·0	5099·7	229·6	509·9	
Six-foot do..	8·5	1762·3	3728·96	287·79	749·45	2050·09	4478·41	241·1	526·8	Water pumped over and over.
Young's do.	4·3	848·01	1794·35	250·72	652·91	1098·73	2447·26	255·5	569·1	

Mr. BARRETT said he had had to remodel his works at Grantham, and for the purpose of doing so he made a variety of experiments, especially with regard to washers and scrubbers, the conclusion he came to being that scrubbing was preferable to washing. For twelve months before he took charge of the works the company had only made about £14 by their ammoniacal liquor, with a make of gas of 29 million feet. After the experiments to which he had referred, he determined to adopt a scrubber, but it was not brought into operation before the middle of December. It was an iron scrubber, 37 feet 6 inches high, and 4 feet 10 inches in diameter. At the bottom he put in smooth boulder stones and pantiles, and then five tiers of coke, varying in depth from 15 to 9 inches, and on the top of that 6 feet of dross. The gas went in at the bottom of the scrubber and the water at the top, the latter coming out as 8 or 10-oz. liquor, and this was pumped up to the top of the scrubber again. The week before beginning this work he had used 7 tons of lime to purify the gas, the first week afterwards only 3½ tons, and the liquor was brought up from 8 or 10 to 18-oz. strength. At the present time he was not making more than 26,000 feet of gas in 24 hours, and was delivering liquor of from 12 to 14-oz. strength. He thought this was conclusive evidence that scrubbing was preferable to washing. He did not find any additional back pressure in consequence of the use of the scrubber. He might add that during the last six months the receipts for ammoniacal liquor were £120.

Mr. G. ANDERSON said he did not rise to give the members a dissertation upon the comparative merits of washers and scrubbers. That was a thing upon which he made up his mind many years ago, and had expressed his sentiments thereon at previous meetings of the Association. He only wished to say that it appeared to him the reader of the paper had misunderstood some remarks of his as to his practice in reference to washing and scrubbing. Mr. Hunt, he believed, stated that in a former paper he (Mr. Anderson) first scrubbed and then washed. He begged to say he was not such a fool as that. He used a washer first for two reasons. He kept his scrubber perfectly clean, and, from experiments, he knew that he got more ammonia out of the gas by so doing.

Mr. LIVESEY said he agreed with the writer of the paper, and with Mr. Anderson, that there was a place in gas-works for both washers and scrubbers. The scrubber was really a washer, but, as Mr. Hunt had exactly described it, the washer was an apparatus which compelled the gas to dip into the liquor, whereas the scrubber give a larger wetted surface for it to pass over. He agreed with Mr. Anderson that the washer should come first, and since Mr. Anderson read his paper on the subject, he (Mr. Livesey) had gone into the question of washers. The chief objection to them in old times was the great pressure they occasioned, and the passage of the gas in large volumes; but when such was the result, he did not call that washing properly. What was wanted was, to bring the water or liquid into very intimate contact with the gas, and Mr. Anderson's washer was a contrivance which had that purpose in view. He found in a washer that he had more control over the liquor than he had in the scrubber. The stream of liquor passing down the scrubber was not kept sufficiently long in contact with the gas; but in washing they might have a series of washers regulating the stream of liquor to any degree desired, and getting any strength at will. From experiments made with a series of washers, he had found that he could get the liquor to absorb an enormous quantity of foul gases, and that by keeping the liquor in the washer until it was 31-oz. strength, it contained 2254 inches of SH_2 and 12,224 inches of CO_2 in a gallon, or 14,478 inches of these two gases to the gallon. He found, taking 10-oz. liquor at ordinary condensation, a certain proportion of carbonic acid and sulphuretted hydrogen. Suppose in 10-oz. liquor the carbonic acid and sulphuretted hydrogen to be represented by 10, if that liquor was passed slowly through the washer, raising it to 20-oz. strength, there would not be double the quantity of sulphuretted hydrogen in it, but much more than double the quantity of carbonic acid. He found that if it required a certain quantity of a solution of sulphate of iron to neutralize the SH_2 in 10-oz. liquor when made into 20-oz. liquor in the washer, although it did not require twice that quantity of sulphate of iron for the SH_2, the amount of carbonic acid was enormously increased. What was wanted was to divide the gas into an infinite number of small streams or bubbles. The washer must not give too much pressure; but he was afraid it would not be a very effective one that would work under two or three inches. The Association were indebted to Mr. Anderson for bringing the subject of washers under their attention in past years, and also to Mr. Hunt for the very able paper he had read that afternoon.

Mr. G. ANDERSON said the smaller the particles, no doubt the better the purification; and washers, hitherto, had given more pressure than the exhausters could overcome. He had patented an invention (the design of which

was now exhibited, and a drawing and description was given in the JOURNAL OF GAS LIGHTING, No. 655, vol. xxvi., Nov. 30, 1875, p. 795), by which he endeavoured to overcome the difficulty which many gas managers had experienced in this matter. The bottom of the apparatus consisted of a small portion of his original washer, and the gas passed into it in the ordinary way; but he limited the length of this washer so as to decrease the pressure. He insisted upon the expediency of having it there so as to arrest the tar, and take care that it did not get beyond the base of the apparatus. The gas, after passing from the top of the washer, proceeded upwards into a vessel or scrubber, and round the five circles or drums contained therein. These drums were covered on their exterior and ends with a material such as coarse birch. Hitherto, in constructing the apparatus, he had used brushes such as are employed in stables, with long and strong fibres, about one-eighth of an inch in thickness. The upper vessel was divided into five different compartments, in each of which was a drum covered with these brushes dipping into shallow tanks of water. To work the vessel he put in pure water at the top; the brushes were caused to revolve very slowly in an opposite direction to that in which the gas was flowing, the object being to keep the two as much in contact as possible. The brushes revolving thus slowly, brought up with them a portion of the water from the tank in which the lower part of each drum was immersed, and the gas in its upward passage had to pass through the wetted fibres of the brushes. He believed that he thus obtained as good a distribution of the gas through the purifying material as could be had. The water trickling in at the top of the apparatus would very soon fill the vessel; but provision was made for it to pass into the compartment below, where again, also, some contact with the gas took place. The water coming in pure at the top, received the gas at the end of its passage through the apparatus, and, consequently, when it was nearly purified from ammonia and carbonic acid. He used this in contradistinction from the other process, in which the liquor was pumped over and over again, until it became of the strength required. That was an old and exploded system, and he believed it was not well to bring the gas at the last in contact with strong liquor. The water having passed down the scrubbing part of his apparatus, arrived at length in the washer at the base; but immediately above the washer was another pipe, supplying ammoniacal liquor from the works. The entire liquor thus treated would leave the apparatus by a pipe on the opposite side, of 10, 12, or 14 oz. strength.

Mr. HORSLEY said he should like to ask Mr. Anderson whether the scrubber he had described was not exactly like one in use by Mr. Paddon, at Brighton, except that Mr. Paddon had one vessel placed after another, which he (Mr. Horsley) thought was preferable to having them one on the top of the other.

Mr. ANDERSON said the apparatus was not at all the same.

Mr. PATERSON, of Cheltenham, said he was convinced that one of the prime questions of the day with gas managers was the question of the washing and scrubbing of gas. He did not consider it was necessary that washers should give so much pressure as was usually the case, and he thought that in Mr. Anderson's washer the pressure would be excessive, and therefore the best results would not be obtained. Mr. Anderson expected in his washer that the gas would pass under the several plates which dipped into the liquor from end to end, but it appeared to him (Mr. Paterson) that the pressure required to carry it under the plates nearest the outlet would be so great as to unseal the plates at the inlet.

Mr. ANDERSON said his plan was misunderstood by the last speaker. He placed his washer at an angle, so that if he wanted 3 inches pressure it was placed 3 inches out of the level, and so on.

Mr. HUNT, in reply, said he had first of all to express his regret that the reading of his paper was imperfectly heard, and consequently that, in some respects, his meaning was misunderstood. Mr. Anderson complained that he had been represented as having stated that he first scrubbed and then washed his gas. The remark on his paper, however, was as follows:—"His process consists in first washing the gas, and finally passing it through a scrubber; the latter being supplied with clean water, and the liquor so obtained passing back to the washer, and mixed with that from the hydraulic main." This, he thought, would explain and set the matter right. With regard to Mr. Livesey's remarks, as to being unable to control the strength of the liquor in the scrubber so well as in the washer, he considered that this was not altogether correct. So far as he had observed, it could be equally as well controlled in the one case as the other. In the instance Mr. Livesey had quoted of the action of a washer, it seemed that it took out only 400 cubic inches of foul gas per ounce strength, a result far below what he had shown to be attainable by scrubbing. What he had endeavoured to show by his paper was, that for the first process of getting out the bulk of the ammonia, very simple apparatus was sufficient. It was not necessary to have a series of scrubbers; for by using pure water altogether, they lost the advantage of getting rid of a portion of the impurities by means of that portion of the ammonia thrown down by condensation, since the liquor from the hydraulic main and condenser did not contain anything like the proportion of foul gas that the liquor from the scrubber did. Mr. Anderson remarked that the process of pumping over and over again, in order to get the liquor as strong as required, was an old and exploded system. He (Mr. Hunt) agreed with him that for the final process this was so; he only said that a large proportion could be taken out by this means, with excellent effect as regards removal of foul gases. What he had observed was, that from his experience of washers, he believed they were capable of being most effective substitutes for the large scrubbers now used for the final process. With regard to back pressure, he could not himself see that anything like four or five inches should be required, even with washers. He had seen a washer in use which did not throw anything like that pressure, but only from 1½ to 2 inches, and yet took out all the ammonia, water being passed once through it. It seemed, however, from the results he had been able to gather, that the bubbling of gas through water was not so effective for the removal of CO_2 and H_2S, as exposing the gas to a large area of wetted surface.

(To be continued.)

Mr. G. Scott, of Tunbridge Wells, writes to say that the remarks attributed to him during the discussion upon Mr. Travers's paper, "Piece-Work *v.* Day-Work," and reported in the last JOURNAL, page 984, were not made by him. Mr. W. Davis, of Hereford, on the other hand, writes to say that the speech inadvertently ascribed to Mr. Scott was made by him. We thank these gentlemen for enabling us to correct the error in our report. We find a difficulty sometimes in ascertaining the names of speakers at these meetings, and the members of the Association do not, as requested by the President, always announce their names on rising.

Mr. F. Wells, of Barking, has issued two photographs, taken by him on the occasion of the visit of the members to Beckton on the 15th ult. Each photograph contains a group of about 300 members and friends, the portraits being very excellent.

THE INSTITUTION OF CIVIL ENGINEERS.—The changes in the register of this corporation during the quarter ended the 24th ult. have included the election of 9 members and 63 associates (of which latter number 10 were previously students), the transfer of 9 associates to the class of members, and the admission of 20 students. On the other hand, the deductions, by deaths, resignations, and erasures, have comprised five members, nine associates, and two students. The effective increase in the three months has thus been 66 of all classes. The numbers on the books are now 14 honorary members, 868 members, 1595 associates, and 399 students; together, 2876 of all classes.

RIO DE JANEIRO WATER-WORKS.

EXTRAORDINARY CONTRACT FOR PIPES.

It is most satisfactory, in these dull times in the various branches of the iron trade, to know that the department of pipe-founding is one of the exceptions to the general rule. In that branch a contract has just been concluded, which, so far as we are aware, has never previously been equalled, either in extent of money value, or in the peculiar importance which it possesses from being settled just at the very time when several other large contracts have become practically finished. When we mention that it is a contract for 80,000 tons of cast-iron pipes, to be delivered at Rio de Janeiro, and that the money represented by it is about a million pounds sterling, it will at once be seen that the importance of this piece of business can scarcely be over estimated.

Much anxiety has existed amongst the large pipe-founding firms, both in this country and on the Continent, as also amongst iron merchants and other persons, since it became known, several months ago, that there was to be thrown upon the market a pipe contract of unusually large proportions. Various inquiries were instituted, and preliminary negotiations opened, with the view of getting the order carried in some particular direction; but it was only within the last two or three weeks that it was satisfactorily learned that in Glasgow alone were there the requisite facilities for executing such an enormous contract with the desired promptitude and upon such advantageous terms as were a *sine qud non* in the eyes of the principal contractor for the works at Rio de Janeiro. Eventually the order was turned in the direction of that city by Messrs. R. Laidlaw and Son, gas and water engineers and pipe founders; but the undertaking was found to be of such gigantic proportions as to make it very desirable, if not even absolutely necessary, to enlist the co-operation of other two pipe-founding firms, whose powers of production in this branch of manufacture are not excelled in any other seat of the iron industries in the kingdom. Those two firms are Messrs. Thomas Edington and Sons, and Messrs. D. Y. Stewart and Co., who have for several years been jointly engaged in a number of very large water-works contracts; and now, for the first time in the history of pipe-founding, there are to be leagued together three eminent firms in the execution of a single contract.

The undertaking to introduce an abundant supply of water into the city of Rio de Janeiro has been taken in hand by the Government of Brazil, the chief contractor being Signor Gabrielli, who, though an Italian, is a naturalized British subject, and is a gentleman who has had great experience as a contractor, three of his undertakings in past years being the Vienna Water-Works, and the new dock works at Malta and Chatham. It is understood that the execution of the entire contract, which has been entrusted to Signor Gabrielli, will cost something like £1,700,000, and that the requisite capital will be raised exclusively by Brazil out of her ordinary resources, and without having recourse to the London money market.

We understand that the piping now contracted for is intended entirely for the conduits—of which there are to be two—leading from the reservoir or source of supply to the city of Rio de Janeiro, the area within the city being already most efficiently and completely laid with service-mains. On that account, the pipe contract under notice is chiefly for mains of large size, 31½ inches in diameter, the smaller sizes forming only about 10 per cent. of the whole. It is intended to commence delivery of the pipes within the next two or three months, and to continue the delivery in regular quantities over a period of two and a half years from the time of closing the contract.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The accumulating experience of every succeeding week, and the facts which abound on all sides in nearly every branch of trade, combine to urge the extreme desirability of a still further reduction of wages, and an enlargement of the working hours. There is not room, under existing circumstances, for the adoption of any alternative measures—the men must work longer than they now do, and they must also work more conscientiously in all respects than at present, before we can hope to regain our old manufacturing supremacy.

The nine hours system is being universally condemned by all grades of employers, and it is freely stated that steps are being taken to restore the ten hours system. The nine hours movement began with the engineers, and, from what I hear, its fate will be mainly determined by the issue of the new struggle in the same branch. In the meantime, the ordinary iron trade grows quieter—if such a change can be said to have taken place in a time when everything plods on the same dull and uninteresting level—and there are no prospects of an alteration. Pig iron is in abundant supply from all the neighbouring and local producing localities, and is to be had at various per centages from the nominal quotations from different sellers. There can be little doubt that some of the pig iron makers, as well as the manufacturers of finished iron, are conducting business at a clear loss, which is, nevertheless, better than closing their works entirely, and so incurring great expense in keeping the machinery, &c., in order.

The coal trade, as a whole, is very indifferent. At some of the steam coal pits, it is true, there is some little business being done in shipping lots at 8s. to 9s. per ton on the pit banks, and, at a few other collieries, there are gas coal contracts on hand, of fair proportions, at similar prices. The bulk of the pits, however, are not working more than half time, and the market is glutted with house coal and small slack. Several local collieries are being closed, as they cannot now be worked at a profit.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The iron trade here continues much depressed, and, as is usual towards the close of the quarter, the falling off in the demand is more perceptible, buyers are evidently again holding back the few orders they have for distribution in the hope of a further reduction in prices, which, however, is not at present very probable; indeed, makers generally declare their determination to close their works altogether rather than submit to any further reduction. Under the present circumstances of production, a further decline in the price of fuel would, doubtless, affect the iron market, and some buyers are looking hopefully for it, but the leading members of the trade are by no means sanguine of relief in that quarter. However, an important meeting of the coal trade was held at Dudley on Friday last, at which the coalowners explained to the men's delegates who were present, that in consequence of the representations made to them by the ironmasters of the district, to the effect that in the present crisis of the iron trade much relief would be afforded them by a further change in the coal trade, they had met together to try to devise some means of meeting the case, and were of opinion that the working hours of colliers should be increased to nine and a half hours per day, when the coalowners would be able to declare a reduction in price. After some discussion, the delegates consented to submit the question to the men, and give a reply in fourteen days. Much distress prevails among the colliers, owing to the scarcity of employment, and this distress is likely to be increased by the closing of the mines in the Bilston district, either voluntarily, with the object of escaping liability from drainage rates, or compulsorily through the flooding which is expected to ensue on the discontinuance of pumping operations. Prices for both coal and iron may be reported stationary. In exceptional instances common cinder pig has been sold at £2 10s. per ton, and unmarked bars at £7 2s. 6d. per ton.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Although a few of the gas-coal contracts have been placed, the large consumers, as a rule, still hold back, and their decision with regard to the tenders which have been sent in has, in many cases, been postponed for the present, owing to the uncertainty as to prices. There is evidently a belief that further changes in the market will take place, which will enable buyers to place their contracts on more favourable terms than at present, notwithstanding that in some cases very low prices have already been accepted. For other descriptions of coal there is very little inquiry. The demand for house coal has fallen off very considerably during the past fortnight; common coal for iron-making purposes is difficult to sell, and there is no push for engine classes of fuel. Although no general reductions in quotations have been made this month, large orders can be placed at very low prices, and there is a general weakness in the market, which may lead to a further drop in values. The average pit prices in the Wigan district, which, however, can only be said to apply strictly to small sales, may be given as under:—Best Arley Mine, 11s. to 12s.; common, do., 9s. to 10s.; Pemberton four-feet, 8s. 9d. to 10s.; common coal, 7s. to 8s.; burgy, 5s. 9d. to 6s. 3d., and slack, 3s. 9d. to 4s. 6d. and 5s. per ton.

There is still very little doing in the shipping trade, and in the coasting branch there is only about half the usual quantity being sent away.

Many of the pits are not now working more than two to three days per week, and, in some cases, are temporarily stopped altogether.

A meeting of South-West Lancashire miners was held on Thursday at Wigan, to decide what steps should be taken with reference to the 15 per cent. reduction As I anticipated in my last report, the masters have declined to entertain any proposition for a compromise, but the men do not give up hope of getting the amount lessened, and it was resolved to endeavour to get a joint meeting of masters and men, to induce the colliery proprietors to agree to a smaller reduction.

During the past week a further reduction has been made in the bid price of Lancashire pig iron, which, delivered into the Manchester district, is now quoted at 57s. 6d. per ton for No. 3 foundry, and 56s. 6d. per ton for No. 4 forge; but very little is being sold, and makers would be willing to take lower prices than these to secure orders. In Middlesbrough-iron, although merchants continue to push sales at very low prices, makers do not seem disposed to go any lower, and their quotations remain nominally the same as last week. Manufactured iron continues very flat, and there is a great deal of underselling to secure business, although nominally quotations remain the same as those given of late.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

For all practical purposes there were few shipments of coals, and little business transacted on the Tyne last week. Most people were off holidaying, for those who were not at Newcastle races were in the country, or down on the sea coast, enjoying the summer weather. The most satisfactory point in connexion with the coal trade this week is the fact that the Durham pitmen, by a substantial majority of the collieries, have agreed to refer the question of wages to arbitration; the trade will, therefore, go on tolerably smoothly. There is hardly the ordinary summer demand for gas coals, and inferior sorts are low in price. Small manufacturing coals are quoted at a wretched figure. At some of the Northumberland pits they may be had at 2s. 6d. per ton. Steam coals are in fair demand. For best sorts the shipping turns are from eight to ten days, for gas coals from four to six days. Active work has been resumed at the pits, and shipments will be large this week.

The coasting trade is extremely dull. Neither south country merchants nor gas-works put many orders into the market. London rates for steamers are down to 4s. 3d. per ton. Outward Baltic and Mediterranean business is quiet. The war rumours which are coming up from the East are producing a disturbing effect upon shipping trade generally, and there is a good deal of uncertainty about business at the present moment.

The local demand for coals is very weak, and all those pits depending upon the iron trade are likely to be very badly employed during the whole of the summer; this is especially true as regards the South Durham collieries. Many of them are likely to continue upon half time.

The depression in the iron trade seems to have got chronic. It shows no improvement. Week after week there is the same report to make. There appears to be a considerable change in the trade on account of steel-faced rails being more in demand for the continental railways. But there seems little doubt but that the iron trade is suffering, to some extent at least, from inferior iron which was sent upon the Continent during the period of inflated prices. Railway companies have been disappointed in quality, and they are very cautious as to the sort of iron they will use again. A fair quantity of water and gas pipes are being made for the home and foreign markets, and the foundries are busier than any other branch of the iron trade.

The general manufacturing business of the North of England shows no improvement. It could not well be more dull than it is. The chemical trade is a little brisker, but the shipments of manufacturing articles are extremely limited, and continental manufacturers and merchants continue to do a very hand-to-mouth trade.

There is not so much doing in house building as there was. It may be too soon to reckon upon it, but it can hardly be anticipated that bricklayers, joiners, and others employed in the building trade, can maintain a rate of wages so much above the ordinary average of the district.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The directors of the Anstruther Gas Company have recommended the annual meeting of the shareholders to declare a dividend of 8 per cent., and to reduce the price of gas to 6s. 8d. per 1000 cubic feet, the present price being 7s. 6d. It is also proposed to add £100 to the reserve-fund.

At Grangemouth the price has been reduced to 5s. 1d. per 1000, cubic feet and at Elgin 10d. per 1000 feet. The Annan Gas Company's directors have recommended that the price of gas be reduced from 5s. 10d. to 5s. 4d. per 1000 feet., the reduction to take effect from the 1st of May last. The Auchtergaven Gas Company (Bankfoot), Perthshire, at their eleventh annual meeting recently held, resolved to declare a dividend of 2½ per cent., and to pay off £100 of debt.

The Stirling Gaslight Company have made a reduction from 4s. 7d. to 4s. 2d. per 1000 feet., the reduction to take effect from and after the survey of the meters made in May last.

The Kelso Gas Company's annual meeting was held a few days ago, when the shareholders, on the recommendation of the directors, declared a dividend of 10 per cent. A similar dividend was declared by the Markinch Gaslight Company at their annual meeting, and at the same time it was resolved to reduce the price of gas from 6s. 8d. to 5s. 10d. per 1000 cubic feet. The company continue to supply gas to the street-lamps free of charge.

The Milngavie Gas Company have also reduced the price of gas from 6s. 8d. to 5s. 10d. per 1000 feet. At the annual meeting of the Auchterarder Gas Company, recently held, it was resolved to lower the price of gas from 8s. 9d. to 8s. 4d. per 1000 feet, and to supply the public lamps gratuitously. The meeting also agreed to declare a dividend of 7½ per cent. for the past year.

Last week's report upon the quality of the gas supplied in Glasgow shows that in no case was the illuminating power under the standard fixed by Act of Parliament. The minimum ranged from 26·25 candles at Dawsholm, to 27·88 candles at the Partick station, while the maximum ranged from 27·60 candles to 30·10 candles. The highest average (28·86 candles) during the week was shown by the gas made at the Tradeston station. Dr. Wallace, the official gas examiner for the city of Glasgow, does not in this report give the impurities, except in the case of Dalmarnoch—the sulphur is set down as amounting to 14·04 grains per 1000 cubic feet, and the ammonia at ·16 grains.

The last report, by Mr. J. Falconer King, on the gas supplied by the Edinburgh Gas Company, gives the illuminating power at 29·70 candles, while that of the Leith Gas Company was 28·79 candles.

The Fraserburgh Police Board have re-examined a communication from the Board of Supervision, stating that they have passed a minute recommending the Public Works Loan Commissioners to grant a loan of £9000 towards the payment of the water supply works now nearly completed, and a comprehensive system of sewage which has only just been commenced.

Arrangements have just been started whose aim is to supply the burgh of Inverurie with water. The water supply is to be obtained on the lands of the Earl of Kintore, Mr. G. Gordon Jenkins, C.E., being the engineer, and Messrs. Chalmers and Collie, Aberdeen, being the contractors.

Dr. E. J. Mills, F.R.S., has lately issued a report on the quality of Loch Katrine water. The solid matter was 3·38 grains per 100,000 parts of water, the hardness 0·01, and the organic nitrogen 0·000.

A Provisional Order has been granted to the Irvine Local Authority, in order that the new gravitation water scheme may be proceeded with immediately.

Very little has been done in the Glasgow pig iron market during the past week, and on Friday only a limited amount of business was done in warrants at 57s. 4½d. cash, the forenoon market closing rather in favour of sellers, buyers offering 57s. 3d.

House and steam coal still meet with only a limited sale. Many collieries have now for some weeks been working only half time, and there seems to be no prospect of an improvement.

EXETER WATER COMPANY.—The annual general meeting of shareholders was held on the 13th ult.—Mr. R. Sanders in the chair. The report of the committee stated that, since the last meeting, a duplicate pumping-engine, upon the most improved principle, had been erected at the reservoir, for the purpose of supplying the high-level district, thus completing the whole of the works recommended in Mr. Dymond's report of February, 1870. The telegraph in communication with Marypolehead, the St. David's reservoir, and the company's office in Bedford Circus, was in course of construction, and would, when complete, afford additional protection in case of fire or other emergency. This would complete the outlay on the new works account. The works in general were in a good and efficient state. The filter-beds had been recently cleaned out, and all the mains and service pipes were in perfect order. The services in Newtown—namely Sandford Street, St. John's Street, and Clifton Street—had been taken up, and the old 3-inch pipes replaced by new 4-inch pipes, thus affording a large additional supply to that populous and increasing neighbourhood. A large number of houses was now in course of construction at Culverlands, adjoining the Union Road, and the committee had ordered a new 3-inch main to be laid down for their supply. No further communication had been received from the local board relative to the question of purchasing the works of the company, and until some definite proposition was made by them in answer to the question put to them by the committee, the subject had remained in abeyance. Some little difficulty had been experienced in arranging terms with the local board for the supply of water for watering the streets and flushing the sewers, but it had been determined by the committee of the council, subject to the approval of the general body, to take the supply for watering by meter, at the rate of 9d. per 1000 gallons, and to pay £8 for each flush. In the meantime, and until the meters were fixed, the committee had stipulated that the council should pay for water at the rate of £450 per annum from Lady-day last. Some observations had been made as to the supply of water for extinguishing fires, with various suggestions for its improvement. The whole matter was now under the consideration of the General Purposes Committee, with whom the chairman had had an interview, and when the requirements of the council were known, and the course they proposed to adopt for obtaining the same were laid before the committee, it would receive their most careful and serious consideration. The financial position of the company was satisfactory. The rental had been maintained. The balance in the hands of the treasurer was £2247 10s. 2d., and the committee recommended that a dividend of 6 per cent. be declared as heretofore.

CLIMBING A STAND-PIPE.—Some reparations having become necessary upon the stand-pipe at the Spring Garden station of the Philadelphia Water-Works, amongst which the scraping and painting of the exterior, which had become weather-worn and rusted, was the most considerable task, the first step to be taken was obviously to construct a scaffold for the workmen; and, as no means had been provided for the attachment at the top of the pipe of the blocks and falls from which a scaffold should be suspended, the climbing of the pipe for this purpose was an undertaking which preceded all others. This climbing was accomplished by Mr. George Robinson (a working rigger of this city) in the following way:—The stand-pipe itself is 127 feet of wrought iron shaft, above a square stone plinth, the shaft being about 6 feet in diameter at the bottom, and 4½ feet in diameter at the top (under the cap, or head ornament, which projects 12 or 16 inches all round). At the foot of the plinth, a light ladder, 30 feet long, was set up, with the top to rest against the shaft. Climbing the ladder to the top, carrying a bow or ring of half-inch round iron rod, which was made to surround the shaft loosely, with the ends about 16 inches long turned downwards, these ends were lashed fast to each side of the ladder. Next, a piece of rope (3 inch = 1 inch diameter), with an eye in one end, was passed also round the shaft, and was lifted to the top of the ladder, below the ring of iron, when the plain end of the rope was drawn through the eye and made fast, so that the rope formed a "lashing," and encompassed the shaft tightly. A single block was now hooked on to this lashing, and the end of the fall passed down between the ladder and the shaft, was made fast to the lower round of the ladder, and the ladder itself then hauled up to the lashing, and with its upper end steadied by the ring of iron was placed vertically against the side of the shaft. Another ring of half-inch iron was placed around the shaft at the bottom of the ladder, which ring was also lashed to the sides of the ladder, and steadied the bottom whenever it was attempted to lift by the lower round. The ladder being elevated as described, and held in its place by making the hauling side of the fall fast to something below, another lashing like the first one was taken to the top of the ladder (in point of fact, Robinson stood upon the top of the ladder each time it was hauled up, and took with him this second rope); and this rope was then converted into a second lashing like the first one, only about 25 feet higher up on the shaft. A second block was hooked into this second lashing, and the end of a fall from it was taken down behind the ladder to the lower round, and made fast, while the other end was hauled tight to relieve fall number one. Lashing number one was now cast off, and taken to the top of the ladder, and by means of the second fall the ladder, with Robinson upon it, was lifted to the second lashing. At this point the operation merely repeated itself, except that, from the reduced diameter of the shaft, it was necessary to bring the head of the ladder up to the lashing and make new ends to the top bow of iron (which could be bent cold) twice in the whole climbing. The bottom ring it was not found necessary to reduce in dimension. Five fleats brought Robinson to the top of the shaft, and as the top of the ladder was then hung far enough from it, he was able to pass at once over the projection of the cap, and mount upon the plates which covered this projection (a low ornamental railing surrounds the cap). Having reached the top, the other attachments became easy. The man Robinson, and another rigger to handle the rope, aided by one or two men, when a pull was required, performed alone all the labours of the task. They came to the Spring Garden works at about 10 a.m.; and in less than two hours (before 12 a.m.) the column had been climbed, and the ladder was sent down.—*Journal of the Franklin Institute.*

TORQUAY GAS COMPANY.—The annual general meeting of the shareholders in the above company took place on Thursday last. A very prosperous state of things was reported by the directors, full parliamentary dividends declared, officers appointed, and an intimation given of a substantial reduction in the price of gas.

SALE OF NEW RIVER COMPANY'S SHARES.—At the Auction Mart, on Wednesday last, one-thirteenth part of a King's share in the above company was sold for £2945, being at the rate of £88,050 per share; and seventy-four £100 shares, with £60 per share paid, in the same company, realized from £280 to £290 per share, making a total of £21,040.

A GAS ENGINEER'S SON SAVED FROM DROWNING.—On Wednesday last the youngest son of Mr. James Harris, owner of the Ross Gas-Works, was nearly drowned while bathing in the Wye, about a mile above the town. Through the gallantry of a young man, named Isaac Downing, he was rescued from his perilous position. It is stated that this is the fourth instance in which Downing has been instrumental in saving the life of a fellow-creature.

MUIRKIRK GAS COMPANY.—The annual meeting of the shareholders of the gas company of this town was held in the company's office, on Monday, the 26th ult.—Mr. Howatson, of Dornel, in the chair. The company seems to be in a highly prosperous condition, for, while the gas to consumers is the cheapest of that of any town in Scotland, perhaps of equal size, being only 5s. 5d. per 1000 feet, a dividend of 10 per cent., free of income-tax and cost of remittance, was declared. A vote of thanks to Mr. Howatson closed the proceedings.

GAS AFFAIRS AT IPSWICH.—At the meeting of the Ipswich Town Council on the 28th ult., the Paving and Lighting Committee reported that, in pursuance of a resolution of the council, they had inquired of the gas company whether the company were willing to sell their gas-works, plant, &c., to the Urban Sanitary Authority, and if so, upon what terms. The company having stated in reply that they were not desirous of selling their works, but were willing to consider any offer the authority might make to them, the committee had placed the matter in Mr. Stevenson's hands, to advise the authority what terms should be offered. Upon receiving Mr. Stevenson's advice, the committee would submit the same to the council.

NEW GAS COMPANIES.—The Farnborough District Gas Company has been formed for supplying the inhabitants of the parish and vicinity of Farnborough and North Camp Town, Surrey, with gas. It has been registered with a capital of £10,000, in £10 shares. A company called the "Pickering Gas and Water Company" has been registered, with a capital of £10,000, in £10 shares, for erecting necessary works for supplying gas and water to the inhabitants of Pickering, Yorkshire. A company has been formed for supplying gas to the neighbourhood of Knowle, Warwickshire. It has been incorporated with a capital of £5000, in £20 shares. A company has been formed to erect works and carry on the manufacture of gas at Cwmbran and Ponteneuydd. The capital is £5000, in £5 shares.

A COSTLY AMUSEMENT.—On Wednesday last, Henry Stevens, an engine cleaner, in the employ of the Great Western Railway Company, was charged before the Police Magistrates at Bristol with breaking one of the public gas-lamps. Mr. Alsop, inspector of the gas company, said that the inconvenience the company were put to by the wholesale breaking of the city lamps was immense. The lamp now broken by the prisoner had been destroyed three times in one day, and eight times in the course of a week. A policeman proved seeing the prisoner breaking the lamp, and at once took him into custody. Fined 40s. and costs, or three weeks imprisonment.

EXPORT OF COAL IN 1875.—The annual return stating our export of coals, cinders, and patent fuel, shows that the quantity we send abroad increases by half a million, and sometimes a million, tons a year. A check, the result apparently of temporary high price, caused a falling off exceeding half a million tons, in 1873, but was followed by a rise of above a million tons in 1874; and in 1875, for the first time, the export exceeded 14 million tons. Of this quantity, above 11 millions were shipped for European ports, France and Germany heading the list; about a million and a half tons went to America, nearly all of it to South America and the West Indies; nearly three-quarters of a million went to Africa, above half a million being shipped to Egypt; and about 900,000 tons were shipped for India and other Asiatic countries. Thus far, in 1876, the export of coal shows a continued increase.

POLLUTION OF RIVERS BILL.—On Thursday last a deputation from the Alkali Association, consisting of Mr Stevenson, M.P.; Messrs. R. E. K. and L. Muspratt, of Liverpool; Dr. Hewitt, Manchester; M. G. G. Cooper (of Charles Tennant and Co., of Glasgow); Mr. J. E. Gamble, St. Helen's; Mr. Sinclair, and Mr. Simpson, parliamentary agent, had an interview with the President of the Local Government Board, as to certain amendments in the Pollution of Rivers Bill. They wished to give to new channels, which might be substituted for the existing channels of the established works, the same privileges which were conferred on existing channels; that mining pollutions should be put on the same basis as refuse from manufactories; that the powers to be given to the Local Government Board and sanitary authorities should be struck out of the bill; and that appeals from the county court judge should not be confined to matters of law, but should extend to the merits of the case. The president, in reply, said he should take their representations into his consideration.

HINCKLEY GAS COMPANY.—The annual meeting was held on the 20th ult.—Mr. W. G. Farmer in the chair. From the report and accounts presented, it appeared that for the year ending March the 25th the net receipts for gas, &c., were £3269 5s. 6d. The trade in coke was depressed, and the reduction in cost was not in proportion thereto, but it was hoped future contracts would be on easier terms. Rates and taxes were heavy and unfair, the call of 15s. per share, amounting to £1500, paid off a loan of £1000, and met the outlay in extension of plant and mains. The receipts had suffered to the extent of £200 by the reduction of 5d. per 1000 on the gas. The net profit of the year, £642 2s. 8½d., would admit of a dividend of 6s. 5d. per share, with 9s. 4½d. over, and £155 4s. unappropriated last year might also be dealt with. A dividend at the rate of 6 per cent. for the year was declared, carrying forward £32 6s. 8d. The heaviness of local rates and taxes was commented on, and it was the general impression that public companies suffer much in that respect.

PETROLEUM FOR STREET-LAMPS.—A correspondent writes as follows:—"There is a firm of the name of Messrs. Bayley and Son, of Poole, who forward a circular to the chairmen of local boards in various parts of the country, announcing their readiness to undertake the lighting of street-lamps with petroleum oil. This circular states that the light is equal to 16-candle gas, and can be supplied at one-half the cost of gas. A flattering testimonial is appended from the Corporation of Poole, vouching for the excellence of the light, its cheapness, and numerous advantages as compared with gas. Recently, the chairman of the Sheerness Local Board brought this advantageous offer under the notice of the board, and the surveyor was instructed to report thereon. Application was made to Messrs. Bayley and Son, who offered to supply and light the lamps of the district, exclusive of five nights at each moon, for the charge of £3 10s. per annum. The surveyor of the local board, in reporting this, stated that the present cost of lighting by gas in the district was £3 5s. per lamp per annum, or 5s. per lamp less than the tender for oil lighting, which was to have performed the service at half price. The street-lamps at Sheerness are supplied on the average meter system, the board paying 4s. 6d. per 1000 feet for the gas they consume. If Messrs. Bayley and Son intend to compete with gas companies in street lighting it would seem that a much more tempting saving must be held out. Of course, where the local authorities are disposed to be dissatisfied with the gas company, with or without cause, as often happens, such offers as that of Messrs. Bayley and Son are very readily caught at, but companies charging a fair price have little to fear."

THE NEW RIVER COMPANY.—The New River Company are engaged in the sinking of a new well into the chalk formation at Turnford, to obtain at that place a fresh supply of water, by a large boring into the lower green sand. This boring was commenced at the beginning of 1874, and it had reached the depth of 740 feet from the surface in November last; at this depth it has entered the marl below the chalk, and it is now being widened out to the diameter of 34 inches preparatory to the insertion of the tubes which will be required for further boring through the marl and gault. To provide for the increasing demands of their district, the company are making several important additions to their distributory works, to effect the separation of the very different levels of their service into convenient zones, and to add to the power and means of communication by which their different stations are enabled to assist one another. The new works at Hornsey include five new filtering-beds of a joint area of 3½ acres; four new engines of a joint power of 440 horses; a new high service reservoir on Crouch Hill, capable of holding 12 millions of gallons; and about 13 miles of large mains, to be laid down as lines of communication between the works just described, and for connexions with existing pipes; the filtering-beds are finished, and the construction of the reservoir, engines, and buildings is progressing satisfactorily. —*Engineering.*

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

2374.—DANN, J. T., North Brixton, London, "Improvements in the construction of apparatus for lighting, extinguishing, and regulating gas flames." A communication. June 7, 1876.

2384.—SIMCOX, E., Birmingham, "Improvements in the manufacture of taps and cocks." June 7, 1876.

2387.—LOVELL, T., Nuneaton, Warwickshire, "Improvements in purifying sewage, and in the means and apparatus for effecting the same." June 7, 1876.

2409.—FISON, W. F., Ilkley, York, "Improved means or apparatus for exhausting gas-retorts." June 10, 1876.

2430.—NORTH, J., Connecticutt, U.S.A., "Improvements in steam-pumps." June 12, 1876.

2455.—BRADDOCK, J., sen., and J., jun., Oldham, Lancs, "Improvements in the construction of governors for regulating the flow of gas or air." June 14, 1876.

2472.—BLAMIRES, T. H., Huddersfield, "New or improved means and apparatus for automatically opening and closing taps, valves, ventilators, and other similar purposes." June 14, 1876.

2474.—SMITH, F., South Hackney, London, "An improved union or coupling for the connexion of metal or other pipes, cocks, or valves." June 15, 1876.

2476.—KRAMME, C. D. E., Berlin, "Improvements in suspending gasaliers, chandeliers, and other lamps." June 15, 1876.

2489.—PLESSNER, J. M., Golden Square, London, "Improvements in the construction and arrangement of water or liquid meters." June 15, 1876.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

4296.—BRESSON, A., Forest Hill, London, "An improved process for producing benzine, light oil, and anthracene from hydrocarbures." Dec. 11, 1875.

4320.—MILBURN, R., New Cross Road, London, and JACKSON, H., Leeds, "Improvements in the method of and in means for decomposing or rendering less noxious the vapours resulting from processes of drying sewage deposit, excrement, blood, and other matters." Dec. 13, 1875.

4324.—PREISWERK, L., Wilhelmshaven, Germany, "Improvements in propelling vessels, partly applicable for obtaining motive power, for raising water, and for exhausting and compressing air and gases for other purposes." Dec. 13, 1875.

4378.—PARKER, R., Bow, London, "Improvements in ventilating and purifying sewers and in apparatus to be employed for those purposes." Dec. 17, 1875.

4427.—SUGG, W. T., Westminster, London, "Improvements in apparatus for maintaining the proper water level in station gas-meters." A communication. Dec. 21, 1875.

4428.—SUGG, W. T., Westminster, London, "Improvements in station and test gas-meters." Dec. 21, 1875.

89.—MARRIOTT, W., Huddersfield, "An improved method of purifying coal gas." Jan. 4, 1876.

132.—CROSSLEY, F. W., Manchester, "Improvements in gas motor-engines." Jan. 12, 1876.

140.—WILSON, J. J., Edinburgh, "An improved arrangement or construction of apparatus or fittings to be used in supplying and discharging hot and cold water and other liquids, part or parts of which are applicable for other purposes." Jan. 13, 1876.

246.—MOORE, J., Wolverhampton, "An improved apparatus to be employed in relieving the pressure in gas-retorts." Jan. 21, 1876.

414.—ADAIR, W., Liverpool, "Improvements in and connected with pumps." Feb. 2, 1876.

497.—MASON, C., Southampton Buildings, London, "Improvements in and relating to valve apparatus for steam-pumps and other purposes." Feb. 8, 1876.

1013.—CALDWELL, A., Renfrew, N.B., "A new or improved apparatus for controlling or regulating the flow of water or liquids in dwelling-houses, factories, and other buildings, the same being applicable as a water or liquid meter." March 9, 1876.

1108.—BOULTON, M. P. W., Tew Park, Oxford, "Improvements in apparatus for producing heat by the combustion of inflammable gases or vapours, and for generating the latter." March 16, 1876.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1471.—BAGGS, I., "Improvements in the manufacture of gas for illuminating and other purposes, and in apparatus connected therewith." April 23, 1873.

1487.—SKELTON, T. A., "Improvements in street lanterns to facilitate lighting." April 24, 1873.

1504.—WEST, J., "Improvements in apparatus used in the purification of gas." April 25, 1873.

1509.—SCOTT, H. Y. D., "Improvements in the treatment of sewage matters, and in the deodorization of night soil." April 25, 1873.

1555.—BROWN, W., "Improvements in the treatment of sewage, and in the manufacture of manure therefrom." April 29, 1873.

1575.—DUFFEE, E., "Improvements in screens for coal-gas purifiers." May 1, 1873.

1597.—WRIGHT, W., "Improvements in the manufacture of gas for heating and illuminating purposes, and in apparatus for the same." May 3, 1873.

1646.—CUTTER, J. M., "Improvements in steam and water valves." May 7, 1873.

1676.—RONALD, B., and FARMER, J., "Improvements in water-closets, parts of which are applicable to other water cisterns." May 9, 1873.

Share List of Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. Golding, Sun Court, Cornhill, from the latest Stock Exchange Quotations.)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	Gas Companies.	£ s. d	£ s. d	£
10000	20	Anglo-Romano . .	20 0 0	10 0 0	14—16
5000	20	Bahia (Limited). .	20 0 0	..	10—11
1000	20	Do., preference .	20 0 0	..	23—25
1000	20	Do., do., redeem.	20 0 0	..	20—22
1500	20	Do., perpet. pref.	20 0 0	7 10 0	19—21
40000	5	Bombay (Limited).	5 0 0	7 10 0	6¾—7¼
10000	5	Do., fourth issue.	5 0 0	7 0 0	1—¼ pm.
10000	20	British (Limited) .	20 0 0	10 0 0	36—38
7500	20	Cagliari (Limited).	20 0 0	5 0 0	16—18
5500001.	Sk.	*Commercial* . . .	100 0 0	10 0 0	199—202
70000	100	Do., 7 per cent. .	..	..	..
20000	20	Continental Union.	20 0 0	6 0 0	22—23
10000	20	Do., new	12 10 0	6 0 0	1¼—2¼ p.
10000	20	Do., preference .	20 0 0	7 0 0	26—27
5000	10	*Crystal Palace Dis.*	10 0 0	10 0 0	20—20½
5000	10	Do., preference .	10 0 0	6 0 0	12—13
10000	7	Do., ordinary . .	10 0 0	7 0 0	13½—14½
2500	10	Do., converted .	2 0 0	10 0 0	1¼-2 pm.
2500	7	Do., converted .	2 0 0	7 0 0	1-1½ pm.
Total share capital, £8,365,000. Shares in course of conversion into stock.		*Gaslight & Coke* A.	..	..	201—204
		Do. B.	..	..	80—85
		Do. 5 per ct. pref. conv., 1st issue.	..	..	..
		Do. do., 2nd do. .	..	..	..
		Do. do., 3rd do. .	..	..	..
		Do. do., 4th do. .	..	..	..
		Do. 5th do. .	..	..	..
		Do. C 10 p.c. pref.	..	..	225—230
		Do. D do. do. .	..	..	220—225
		Do. E do. do. .	..	..	220—225
		Do. F 5 p.c. pref.	..	..	..
		Do. G 7½ do. do. .	..	..	160—165
		Do. H do. do. .	..	..	143—146

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	Gas Companies.	£ s. d	£ s. d	£
23406	10	European (Limited)	10 0 0	10 0 0	17⅛—18⅛
12000	10	Do., new shares.	7 10 0	10 0 0	5½-6 pm.
35406	10	Do., new shares .	5 0 0	10 0 0	4½-5 pm.
6200	5	Georgetown, Guiana	5 0 0	5 0 0	..
5800	10	Hong Kong (Lim.)	10 8 0	10 0 0	15—16
56000	50	*Imprl. Continental*	43 15 0	9 10 0	79—81
3783501.	Sk.	*London*	100 0 0	10 0 0	198—202
1500001.	Sk.	Do., 1st pref. . .	100 0 0	6 0 0	130—135
14450	Sk.	Do., 2nd pref. .	100 0 0	6 0 0	..
4350	Sk.	Do., 3rd pref. .	100 0 0	6 0 0	..
7622	25	Do., A shares . .	12 10 0	6 0 0	..
2680501.	All	Do., Debent. stk.	100 0 0	5l. & 6l.	..
15000	5	Malta and Mediterranean (Limited).	5 0 0	2 0 0	2½—3
6000	5	Do., preference .	5 0 0	7 10 0	4¾—5½
23000	5	Mauritius (Limited)	2 0 0	..	1¼—1½
25000	20	Monte Video (Lim.)	20 0 0	8 0 0	17—19
8000	10	Nictheroy, Brazil (Limited)	10 0 0	3 10 0	..
30000	5	Oriental (Calcutta) .	5 0 0	9 10 0	8½—8¾
30000	5	Do., new shares .	3 0 0	9 10 0	2—2½ pm.
10000	5	Ottoman (Limited).	5 0 0	3 0 0	2½—3
17500	10	Pará (Limited) . .	10 0 0	7 0 0	3½—4½
27000	20	*Phœnix*	20 0 0	10 0 0	39—41
3600001.	100	Do., new	55 0 0	7 10 0	91—93
1440001.	Sk.	Do., capitalized .	100 0 0	5 0 0	101—104
36000	20	Rio de Janeiro (L.)	20 0 0	10 0 0	30—32
7359	5	Singapore (Limited)	5 0 0	7 10 0	5½—5¾
2000	5	Do., preference .	5 0 0	7 10 0	5¾—6¼
1500	32½	Shanghai	32 10 0	12 0 0	30—32
4000	50	*South Metropolitan*	50 0 0	10 0 0	103—105
4000	12½	Do.	12 10 0	10 0 0	25½—26½
20000	12½	Do., new shares .	9 0 0	10 0 0	11—11½

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	Gas Companies.	£ s. d	£ s. d	£
15000	10	*Surrey Consumers.*	10 0 0	10 0 0	19½—20½
10000	10	Do., new	8 0 0	10 0 0	8—8½ pm
9000	4	Unit. Gen. Limrck.	4 0 0	2 10 0	2—2¼
1500	10	*Wandsw. & Putney*	10 0 0	10 0 0	14—15
1500	10	Do.	10 0 0	7 10 0	11—12
2957	10	Do.	10 0 0	7 0 0	..
993	10	Do.	3 0 0	7 0 0	..
16000	5	*West Ham*	5 0 0	10 0 0	7⅞—8
10000	5	Do., new shares .	2 10 0	10 0 0	3—¾
		Water Companies.			
12000	100	Chelsea	100 0 0	6 0 0	140—142
1800000	100	East London . . .	100 0 0	6 0 0	144—146
8000	50	Grand Junction . .	50 0 0	7 0 0	..
5840	25	Do., ¼ shares . .	25 0 0	7 0 0	..
2160	25	Do., new ditto: max. div., 7½ p.c.	25 0 0	7 0 0	34½—35½
547960	100	Kent	100 0 0	8 0 0	173—176
970	100	Lambeth	100 0 0	6 5 0	143—146
1161	100	Do.	45 0 0	6 5 0	30-35pm
442	100	New River	100 0 0	8 0 0	170—180
4475	100	Do.	30 0 0	8 0 0	50—55
400000	100	Do., deb. sk., 4 p.c.	100 0 0	4 0 0	97—99
3036	100	Southwrk. & Vauxh.	100 0 0	4 0 0	103—105
1296	100	Do., pref. stock .	100 0 0	5 0 0	104—107
..	100	Do., D shares . .	100 0 0	4 0 0	100—102
..	..	Do.	..	4 10 0	..
..	100	Do., new ordinary .	..	4 10 0	..
1600	100	Do., new ord. No. 1	40 0 0	4 10 0	112—114
12172	61	West Middlesex . .	61 0 0	6l. p.sh.	133—135

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

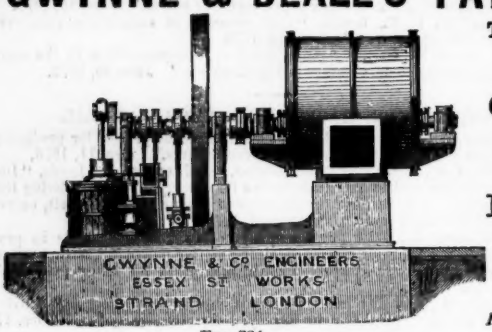


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

GWYNNE & CO.

HAVE MADE THE

LARGEST AND MOST PERFECT

EXHAUSTING MACHINERY

Ever produced, and the most economical in working.

Prices and every information on application.

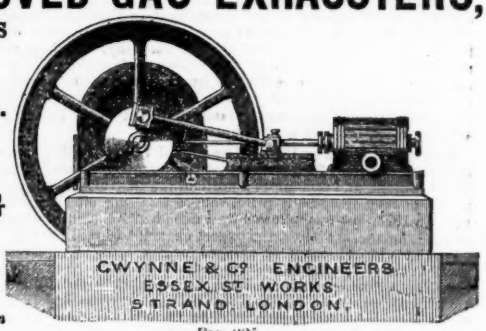


FIG. 225.

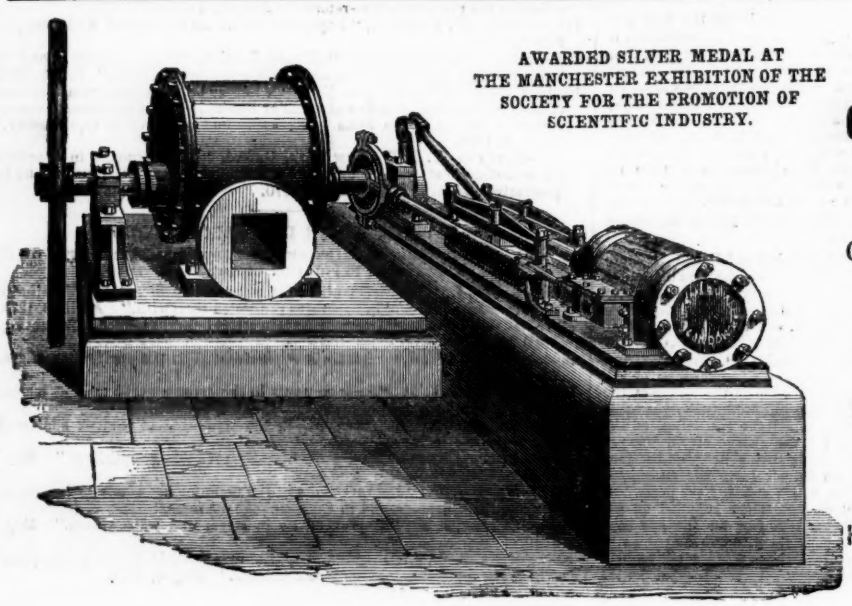
Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make prics the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*



AWARDED SILVER MEDAL AT THE MANCHESTER EXHIBITION OF THE SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.

BEALE'S

Improved Patent

GAS-EXHAUSTERS

WITH

ENGINES COMBINED.

Sole Makers,

GEORGE WALLER & CO.

Makers of

ENGINES, EXHAUSTERS,
INDEX and DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, and other PUMPS,
SCRUBBERS and PURIFIERS,
CONDENSERS, BOILERS, &c.

PHŒNIX ENGINEERING WORKS,

HOLLAND STREET, S.E.,

AND

STROUD, GLOUCESTERSHIRE.

WANTED, a second-hand Purifier, about 6 ft. square; or one equal to about the same capacity.
Address MANAGER, Gas-Works, Settle, YORKSHIRE.

WANTED, a second-hand Cast-Iron GASHOLDER-TANK, with or without columns and girders. Diameter 36 ft. 6 in. by 12 ft. deep.
Address, stating price, and where situated, to Mr. R. L. RENWICK, 16, Market Street, Hexham, NORTHUMBERLAND.

WANTED, a Working Manager for a small country Gas-Work. Must be thoroughly acquainted with the manufacture and distribution of gas, retort-setting, main and service laying, &c.
Apply by letter, stating salary required, &c., to J. P. H., 237, Southwark Bridge Road, LONDON, S.E.

WANTED, by the Torquay Gas Company, an efficient ACCOUNTANT, to attend solely to the Books of the Company.
Applications, stating age, salary required, when disengaged, security proposed, &c., to be sent to the undersigned before the 8th day of July next.
By order,
J. KITSON, Secretary.
Torquay, June 24, 1876.

TO GAS ENGINEERING DRAUGHTSMEN.
WANTED immediately, in the country, a clever DRAUGHTSMAN, competent to design and prepare finished and working drawings and specifications of Gas and Water Works. Salary £150 for the first year.
Copies only of testimonials, with references, to be sent to No. 278, care of Mr. King, 11, Bolt Court, Fleet Street, LONDON, E.C.

REQUIRED, a sober steady Man as STOKER. Constant employment. Wages 24s. 6d. per week. Overtime paid.
Address, with reference for character, Mr. T. H. BOUTTELL, Gas-Works, SLEAFORD.

THE Advertiser, practical and experienced, seeks an engagement as MANAGER of Gas-Works. Is thoroughly conversant with the best methods of manufacture and distribution of gas. Good testimonials and references.
Address No. 275, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

REQUIRED, by the Bahia Gas Company, Limited, at their Works in Bahia, Brazil, an ASSISTANT ENGINEER.
Applications, stating age, salary required, &c., with testimonials (copies only), to be sent here on or before Monday, the 10th of July, marked "Assistant Engineer."
ALFRED J. HEAD, Secretary.
10, Coleman Street, London, E.C.

ENGINEER or Manager of Gas-Works.
Engagement required. Thoroughly conversant with the designing and erecting of works and apparatus, and the manufacture, purification, distribution, analyzing, &c., of gas. Would not object to go abroad. References given and required.
Address No. 277, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVANTAGES OF GAS FOR
COOKING AND HEATING.
HINTS ON GAS BURNERS, &c.
By MAGNUS OHREN, A.I.C.E., F.C.S.
Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

ON SALE—One Round Station-Meter, to pass 12,000 feet per hour, with 8-in hydraulic valves and bye-pass. Will be thoroughly overhauled and fitted with new drum.
Apply to J. AND J. BRADDOCK, Globe Meter-Works, OLDHAM.

NORTH BRITISH ASSOCIATION of GAS MANAGERS.

The FIFTEENTH ANNUAL GENERAL MEETING of the Members of this Association will be held in the ROYAL SCOTTISH SOCIETY OF ARTS HALL, **117, GEORGE STREET, EDINBURGH,** *On FRIDAY, July* 14, 1876, *at Half-past Ten* A.M.
SAMUEL STEWART, ESQ., PRESIDENT, *Will occupy the Chair.*

PROCEEDINGS.

BUSINESS MEETING.
Reading of Minutes.
Admission of New Members, &c.
PRESIDENT'S INAUGURAL ADDRESS.
Auditor's Report.
Election of Office-Bearers.

LIST OF PAPERS AND COMMUNICATIONS.
"Gas Governors, with Description of Peebles' Patent Governors for Stations, Districts, Dwelling-Houses, and Public Lamps." By Mr. D. BRUCE PEEBLES, of Edinburgh.
"A Ready Means of Adjusting the Seal on Dip-Pipes, and otherwise Reducing Pressure on Retorts." By Mr. WILLIAM KEY, of Glasgow.
"Sunday Labour in Gas-Works." By Mr. JAMES ALEXANDER, of Corstorphine.
"The Utilization for Illuminating Purposes of the Gases Resulting from the Destructive Distillation of Shale in the Manufacture of Paraffin Oil." By Mr. WILLIAM YOUNG, of Clippens, Paisley.

LECTURE.
At Three o'clock, a Lecture will be delivered by STEVENSON MACADAM, Ph.D., Lecturer on Chemistry, &c., Edinburgh, on "The Chemistry of the Combustion of Coal Gas."

DINNER.
At Half-past Four o'clock, the Members and Friends will Dine together in the Café Royal Hotel, West Register Street, Edinburgh. Tickets for the Dinner, 5s. each, may be had from the Secretary; early application for which is specially requested.
WM. M'KENZIE, Hon. Sec.
Gas-Works, Dunfermline, June 30, 1876.

FOR SALE—One of Anderson's Patent Fuel Machines, cheap.
Apply to C. W. GRIMWOOD, Gas-Works, SUDBURY.

FOR SALE—Two 6 ft. by 5 ft. 6 in. PURIFIERS, with 5-in. connexions complete.
Apply to SECRETARY, Gas-Works, Whitchurch, SALOP.

GASHOLDER COLUMNS FOR SALE, cheap and good, twelve in number, about 30 ft. high, diameter near base 2 ft., near cap 1 ft. 6 in., with moulded caps and bases, guide-rails, and brackets complete, and suitable for a gasholder about 90 ft. diameter by 30 ft. deep.
Offers for same, delivered at a railway station in Lancashire, to be addressed to No. 279, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Hindley Local Board are prepared to receive TENDERS for about 500 tons of WATER-PIPES, from 3 in. to 9 in. diameter.
For specifications, quantities, and forms of tender, apply to the undersigned.
By order,
STEPHEN HOLT, Clerk to the Local Board.
Offices, Cross Street, Hindley, June 21, 1876.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—
A 6-h.p. Patent Trunk Engine. (Beale.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.
Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.
Cast-iron Scrubber, 3 ft. diameter, 20 ft. high.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.
May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.
Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

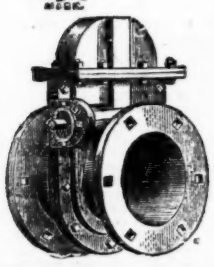
ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

JAMES MILNE & SON,
GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
EDINBURGH, AND
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.
Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES



WITH WROUGHT-IRON PINIONS,
List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.
These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.
VALVES MADE WITH OUTSIDE RACKS TO ORDER.
ALSO, SCREW WATER-VALVES WITH GUN-METAL FACES.
ALSO SOLE MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS.

B. DONKIN & CO.,
GENERAL ENGINEERS AND IRONFOUNDERS,
MAKERS OF STEAM-ENGINES,
55a, BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.

D. BRUCE PEEBLES & CO.,
ENGINEERS,
FOUNTAINBRIDGE WORKS, EDINBURGH,
MANUFACTURERS OF WET AND DRY GAS-METERS;
Patentees and Sole Manufacturers of PEEBLES' LAMP-GOVERNORS,
ABOVE 30,000 OF WHICH ARE NOW IN USE.
"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S.E., F.C.S.*
D. BRUCE PEEBLES AND CO., FOUNTAINBRIDGE WORKS, EDINBURGH.

BRITISH ASSOCIATION OF GAS MANAGERS.

VISIT TO BECKTON, JUNE 15, 1876.

PHOTOGRAPHIC GROUPS OF MEMBERS (about 300 in each Picture), taken on the above occasion, can be had at 3s. 6d. each, post free.

Stamps or Post-Office Orders to

F. WELLS, BARKING, ESSEX.

TO TAR DISTILLERS.

THE Victoria (Newmarket) Gaslight and Coke Company, Limited, are prepared to receive TENDERS for the surplus TAR made at their Works, for the year ending July 31, 1877.

Tenders to be sent to the undersigned before the 12th day of July inst., from whom any further particulars may be obtained.

THOMAS WILKINSON, Manager and Secretary.
Gas Office, Newmarket, July 1, 1876.

TENDERS are invited for the construction of a BRICK TANK for Gasholder. Diameter 36 ft. 6 in., depth 12 ft.

Further information may be obtained on application to the SECRETARY, Gas-Works, STONY STRATFORD, where plan and specification may be seen, or copies can be furnished at a small cost.

Tenders to be sent in by the 20th of July.

The Company do not bind themselves to accept the lowest or any tender.

THE Directors of the Drighlington and Gildersome Gaslight Company are prepared to receive TENDERS for the supply, erection, and completion of a Single-Lift GASHOLDER, 100 ft. diameter and 25 ft. deep.

Further particulars may be had on application to the undersigned, to whom sealed tenders must be sent on or before the 11th day of July next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
CHAS. ARMITAGE, Manager and Secretary.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Torquay Gas Company are prepared to receive OFFERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their works, for a period of One or Three years, as may be agreed on, and to commence at Michaelmas next.

Further information may be obtained from the undersigned, to whom tenders should be sent on or before Wednesday, the 12th of July next.

JAS. GREENFIELD, Manager.

Hollacombe, Paignton.

GAS TAR AND AMMONIACAL LIQUOR.

THE Directors of the Ashton-under-Lyne Gas Company are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their works, for Twelve months ending July 31, 1877.

Further particulars may be obtained on application to the undersigned, to whom tenders, endorsed "Tender for Tar and Water," must be sent on or before Saturday, July 15, 1876.

The Directors do not bind themselves to accept the highest or any tender.

DAVID CLARKE, Manager.

Gas Offices, June 29, 1876.

TO GASHOLDER MAKERS.

THE Atherton Local Board invite TENDERS for the construction, at their works, of a Single-Lift GASHOLDER, 30 ft. in diameter and 26 ft. deep.

Drawings and specification may be seen on application to the undersigned, at the Office of the Local Board, Water Street, Atherton.

Tenders to be sent in on or before July 10, 1876, sealed and endorsed, "Tender for Gasholder."

The Board do not bind themselves to accept the lowest or any tender.

By order,
DANIEL SCHOFIELD, Clerk.

THE Directors of the London Gaslight Company are prepared to receive TENDERS for about 40,000 tons of GAS COAL, as under, viz.:—

During six months from the 1st of September next about 1000 tons per week, and

During three months from the 1st of November next about 1000 tons per week.

The price to be at per ton of Coal delivered alongside the Company's Works at Nine Elms.

Specifications can be obtained at this Office.

Sealed tenders, addressed to the Secretary, marked "Tender for Coals," to be sent in before Ten o'clock on Wednesday, the 12th inst.

By order,
A. J. DOVE, Secretary.

26, Southampton Street, Strand, W.C., July 3, 1876.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

PATRONIZED BY THE ROYAL ARSENAL, WOOLWICH.

FERGUSON, Builder and Contractor. Kite method of Repairing Church Spires and High Chimneys. Chimneys straightened, pointed, and hooped. Old Chimneys pulled down by a process requiring no scaffolding or stoppage of work, by competent workmen, under personal supervision. For Lightning Conductors—cheapness and method of fixing—apply to C. R. FERGUSON, 12, Canal Road, MILE END.

CATHELS'S IMPROVED

RETORT-SETTINGS.

GUARANTEED TO HEAT UNIFORMLY WITH THE MINIMUM OF FUEL.

Coloured lithograph copies of Working Drawings of beds, of 1, 2, 3, 5, 6, and 7 Retorts each, so clearly arranged and fully shown, as to be easily understood by any retort-setter or bricklayer, having just been made of these valuable settings, they can now be supplied with detailed specifications, immediately on receipt of orders.

Applications to be made to Mr. THOS. NEWBIGGING, Gas and Consulting Engineer, 5, Norfolk Street, MANCHESTER.

PONTYPOOL GAS AND WATER COMPANY.

TO EXCAVATORS, BRICKLAYERS, &c.
CONTRACT No. 1.

THE Directors of the Pontypool Gas and Water Company are desirous of receiving TENDERS for the excavating, concreting, and building of brick piers for a Cast-Iron GASHOLDER-TANK, 66 ft. diameter and 21 ft. 9 in. deep, at their Gas Station, Trosnant, Pontypool.

The drawings and specification, with form of tender, may be inspected, and all particulars obtained, on application to the undersigned.

Tenders, enclosed in a sealed envelope, endorsed "Tender for Excavation, &c., Contract No. 1," addressed to Edmund Butler Edwards, Esq., Chairman, Pontypool Gas and Water Company, Pontypool, Mon., to be delivered at the Company's Offices not later than Monday, the 10th day of July proximo.

The Company do not pledge themselves to accept the lowest or any tender.

By order of the Directors,
ANDREW HAIR, Secretary and Manager.
Gas and Water Offices, Mill Road, Trosnant,
Pontypool, Mon., June 15, 1876.

PONTYPOOL GAS AND WATER COMPANY.

TO IRONFOUNDERS AND GASHOLDER MAKERS.
CONTRACT No. 2.

THE Directors of the Pontypool Gas and Water Company are desirous of receiving TENDERS for the supply and construction of a Cast-Iron GASHOLDER-TANK, 66 ft. diameter and 21 ft. 9 in. deep; also a Single-Lift GASHOLDER to work therein, 65 ft. diameter and 21 ft. 6 in. deep, with columns, wrought-iron lattice-work girders, guides, and pulleys, &c., complete, at their Gas Station, Trosnant, Pontypool.

The drawings and specification, with form of tender, may be inspected, and all particulars obtained, on application to the undersigned.

Tenders, enclosed in a sealed envelope, endorsed "Tender for Cast-Iron Tank and Gasholder, Contract No. 2," addressed to Edmund Butler Edwards, Esq., Chairman, Pontypool Gas and Water Company, Pontypool, Mon., to be delivered at the Company's Offices not later than Monday, the 10th day of July proximo.

The Company do not pledge themselves to accept the lowest or any tender.

By order of the Directors,
ANDREW HAIR, Secretary and Manager.
Gas and Water Offices, Mill Road, Trosnant,
Pontypool, Mon., June 15, 1876.

TENDERS FOR GAS COAL.

THE Walsall Improvement Commissioners invite TENDERS for the supply of 14,000 tons of Staveley, Yorkshire, or any other good GAS COAL, which may be delivered either at Walsall Railway Station, or by boat at Walsall Gas-Works; in the latter case it will also have to be unloaded and stacked in the coal-shed, or such other place at the Gas-Works as may be directed.

The Coal will have to be delivered at the rate of from 160 to 450 tons per week, as the Commissioners may from time to time require.

The weight, if delivered by rail, must be 2352 lbs. to the ton, if by boat it must be 22 cwt. to the ton, boat gauge. Payments monthly.

The Commissioners do not bind themselves to accept any tender, and they reserve the right to divide the contract between several firms.

Tenders, sealed and marked outside "Tender for Gas Coal," and stating the price for large Coal, and also for Nuts, are to be sent to the undersigned on or before Saturday, July 15.

SAMUEL WILKINSON, Commissioners Clerk.
Bridge Street, Walsall, June 20, 1876.

THE Gas-Works, at Soham, Cambridgeshire, comprising a most commodious well built and appointed Gas-House, Gasometer, Cottage, and suitable Buildings, situate on the Meerside, with the Yard, Main, Conduit, and other Pipes thereto belonging, and the Lamps and Lamp Posts in the streets of the Parish of Soham, will be offered FOR SALE BY AUCTION, by Mr. George Mainprice (by order of the Directors of the Soham Gas and Coke Company, Limited), at the Crown Inn, in Soham, on Friday, the 14th day of July, 1876, at Three for Four o'clock in the afternoon, punctually (subject to such conditions of Sale as will be then declared).

The works were erected in the year 1843, and during nearly the whole period since their construction have been let on lease at a rent of not less than £100 per annum, are in good repair and condition, and in full working order. They are conveniently situated with reference to the town, and offer a most eligible opportunity to an enterprising purchaser, as the consumption of gas has been steadily on the increase. The proposed line of railway from Ely to Newmarket (which is shortly to be commenced) is likely to be constructed parallel with the yard belonging to the Works, and the station will, according to the present plan of the Railway Company, be erected within a few yards of the same, thereby adding considerably to their present value.

The Gas-Works are freehold, and are now held by Mr. Robert Tebbitt, under a lease for seven years, which will expire on the 21st of August next, when possession may be had.

Further particulars, and conditions of sale, may be obtained of Messrs. HUSTWICK AND LIVETT, Solicitors, and of the AUCTIONEER, all of SOHAM.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,

SCOTSWOOD FIRE-BRICK WORKS,

SCOTSWOOD-ON-TYNE.

THE GAS TRADE CIRCULAR AND REVIEW will be issued (a Second Edition) on the 11th of July, this having been found necessary owing to much valuable matter coming in at the last moment.

Price 3d., by post 3½d., or may be had everywhere at the Book and Paper Stalls of Messrs. W. H. Smith and Sons; or by applying to Mr. FRASER, St. Stephen's Chambers, Telegraph Street, LONDON, E.C.

Just published, price 10s. 6d.,

REGISTRATION OF DISTRIBUTORY PLANT.

The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.

W. J. WARNER, Engineer.

South Shields.

THE Vale of Neath Dinas Fire-Brick and Cement Company, Limited, Pontwalby Works, Glyn Neath, South Wales. Manufacturers of the Celebrated Genuine Dinas Fire-Bricks and Cement for Siemens's Regenerative Gas Furnaces, Bessemer Converters, Copper Smelting, Roofs of Puddling Furnaces, Glass-Works, Gas-Works, Coke Ovens, and processes involving intense and long-continued heat. Prices and estimates on application.

London Agency, 11, Queen Victoria Street, City.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

D. M. NELSON,

48, GORDON STREET (late 135, BUCHANAN ST.),

GLASGOW,

Supplies every requisite in connexion with the distribution of Gas and Water.

Estimates and prices on application.

WOOD GRIDS for Purifiers and Scrubbers.

Cast-Iron PIPES and VALVES.

Street LAMP-PILLARS.

Patent Pipe SCREWING-MACHINES, &c.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET,

DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

JAMES OAKES & CO.,

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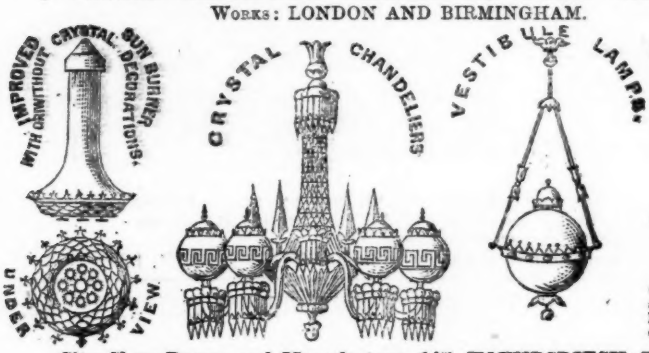

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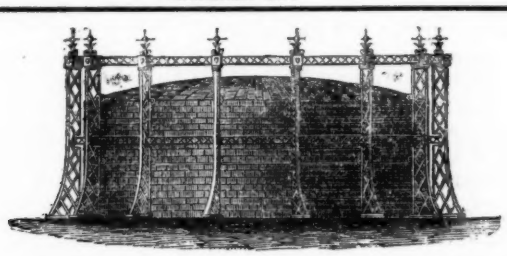

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Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Waggon Works, and the Paint Trade generally. They are the BEST PROTECTORS of IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to ironwork. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only before use to be thinned down in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead.
Carriage Red.	Dark Stone.
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All other Colours made to order.

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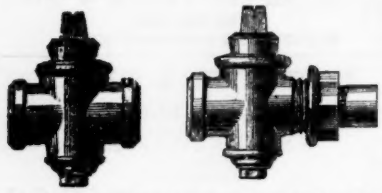
LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

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SHORT STREET, LAMBETH, LONDON.

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ATLAS METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
STATION-METERS, GOVERNORS,
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LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

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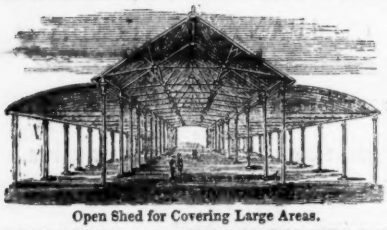
EITHER WITH
TIMBER FRAMING or WHOLLY in IRON.



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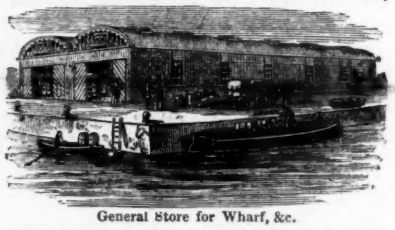

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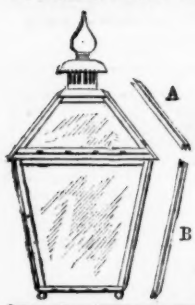

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CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

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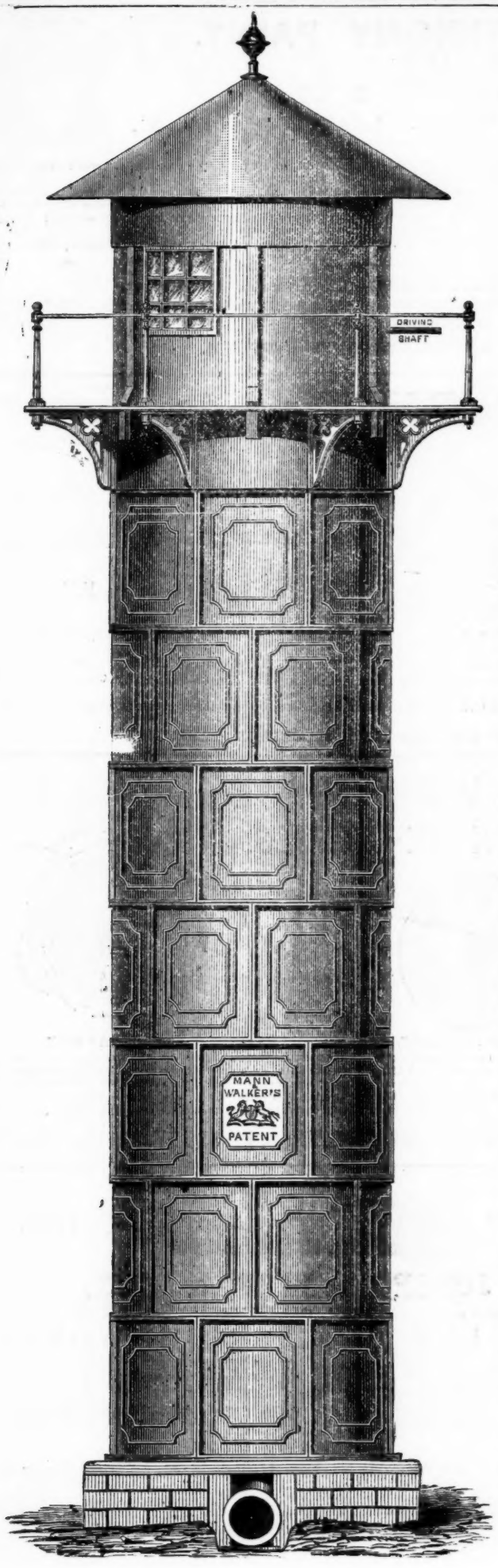

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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

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CLASS II.

1862 LONDINI HONORIS CAUSA

This Paint having been in general use over fourteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

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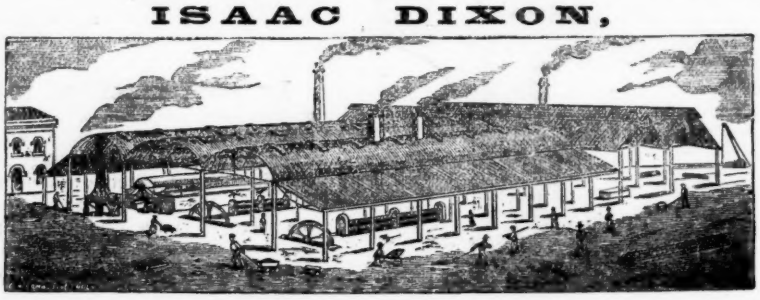

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WROUGHT and CAST IRON GIRDERS, BRIDGES, TANKS, &c., and all kinds of WIRE WORK, FENCING, GATES, HURDLES, &c., for Home or Abroad.

DIXON'S CELEBRATED SELF-SUPPORTING IRON ROOFS are specially suitable for Forges, Rolling-Mills, Iron-Works, Shipbuilding Yards, Mines, Collieries, Gas and Water Works, and for general purposes.

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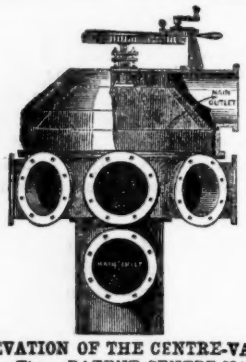
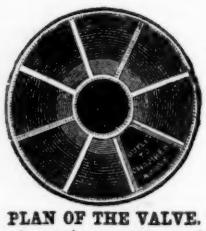


C. & W. WALKERS'
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE. **PLAN OF THE VALVE.** **PLAN OF THE BODY.**

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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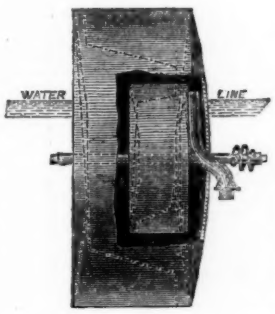

BRITISH ASSOCIATION of GAS MANAGERS, Leeds, 1875.

Inaugural Address of the President, JAMES PATERSON, Esq., F.G.S., of Warrington.

"There are, however, degrees of what may properly be termed excellence; and this leads me to notice one of the most beautiful applications which science has yet devised in the construction of the meter, and which has rendered it an absolutely reliable and unvarying instrument. . . . The object aimed at, and most admirably accomplished, is to change the varying measurement of a varying water-line to an unvarying measure with a varying water-line and annulus."

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It is the ONLY Meter in which reliance can be placed.

It is the ONLY Meter in which the DRUM or WHEEL has been improved since it left the hands of Clegg and Crosley.

It is the ONLY Meter that POSSESSES AN UNVARYING MEASURING-CHAMBER.

It is the ONLY Meter FREE FROM delicate and complex compensating arrangements for maintaining water-line.

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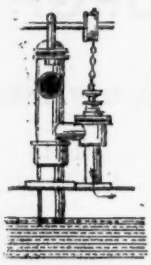
COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH

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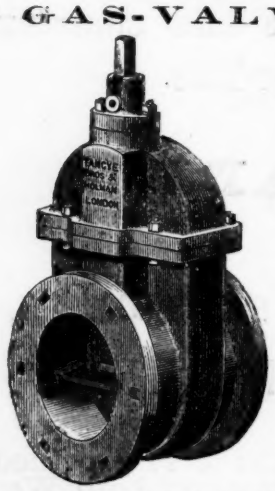

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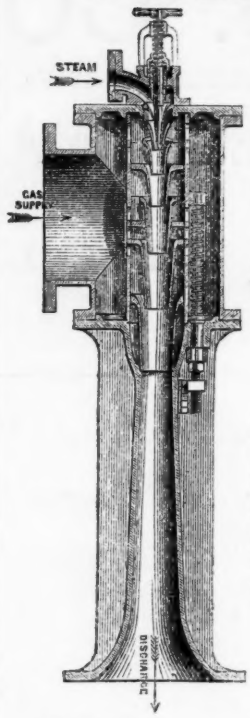

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Small Cost—Compactness—Perfectly Self-Acting—Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—No Extra Room Required—No Wear and Tear—No Noise—No Oscillation in Vacuum, or Back Pressure.

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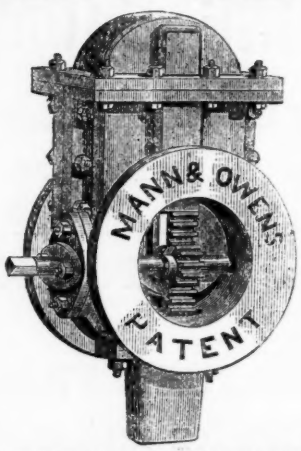
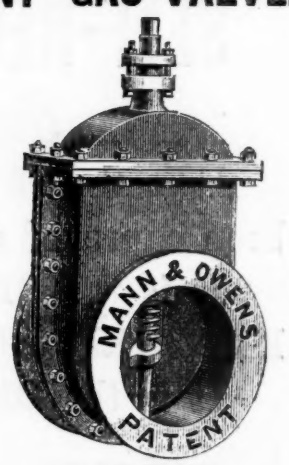


RACK AND PINION VALVE.



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The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

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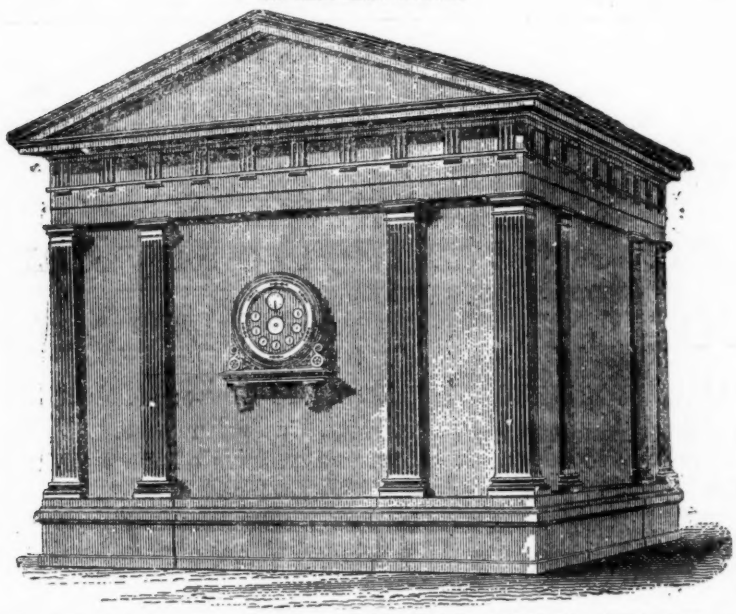

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TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

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PREVENTS WASTE OF GAS FROM RETORTS;

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GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;

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Beg leave to call the attention of Gas Companies to the superior quality of their

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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

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Waggons supplied for delivery by railway to any part of England or Wales.

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POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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Cubic feet of Gas yielded per ton . . .	10,050
Illuminating power in sperm candles . .	15·4
Yield of coke per ton of good quality . .	13¾ cwts.

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NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

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JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

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GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	**10,775**
Weight of coke in lbs. per ton of coal	**1,465**

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This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.		Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	..	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	..	34·83
Value of 1 cubic foot of gas in grains of sperm	780	..	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	..	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	..	71 minutes.
Gravity of the gas (air = 1000)	596	..	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.		Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	..	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	..	33·09
Value of 1 cubic foot of gas in grains of sperm	878	..	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	..	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	..	67 minutes.
Gravity of the gas (air = 1000)	677	..	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company.

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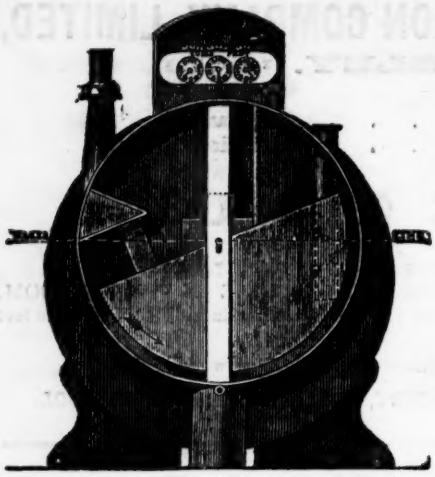

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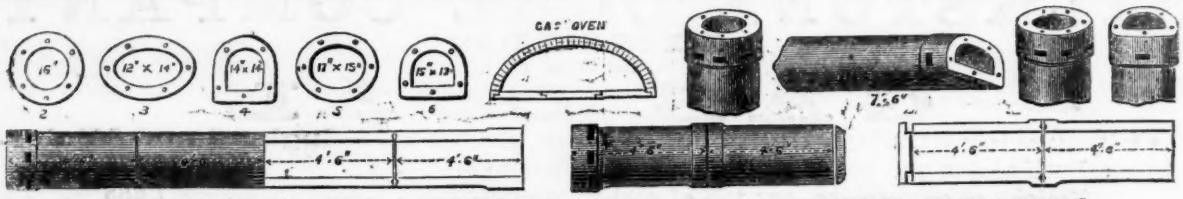

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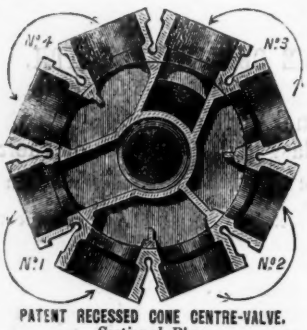

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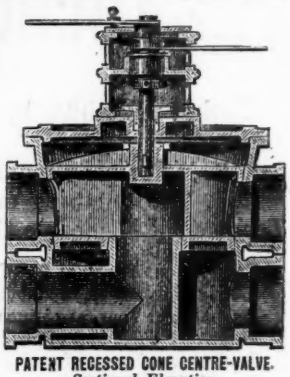

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